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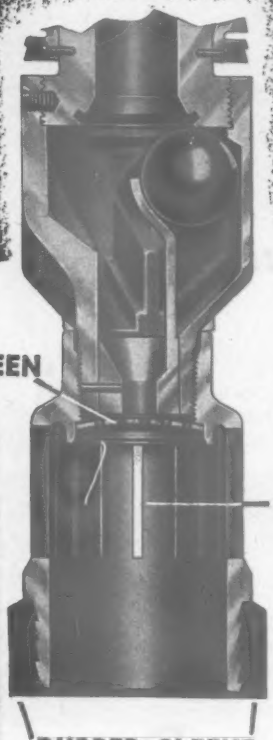

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BAKER OIL TOOLS, INC.

Houston—LOS ANGELES—New York

the OIL AND GAS JOURNAL

Trends

Crude-Oil Production
By States—Page 132

CRUDE-OIL STOCKS 222,929,000 bbl. as of April 21—up 1,905,000 bbl. One year ago 233,632,000 bbl.

GASOLINE STOCKS 95,104,000 bbl. as of April 21—down 2,306,000 bbl. One year ago 88,143,000 bbl.

RESIDUAL FUEL-OIL STOCKS 40,492,000 bbl. as of April 21—down 1,046,000 bbl. One year ago 51,599,000 bbl.

GAS OIL AND DISTILLATE STOCKS 28,219,000 bbl. as of April 21—up 333,000 bbl. One year ago 30,156,000 bbl.

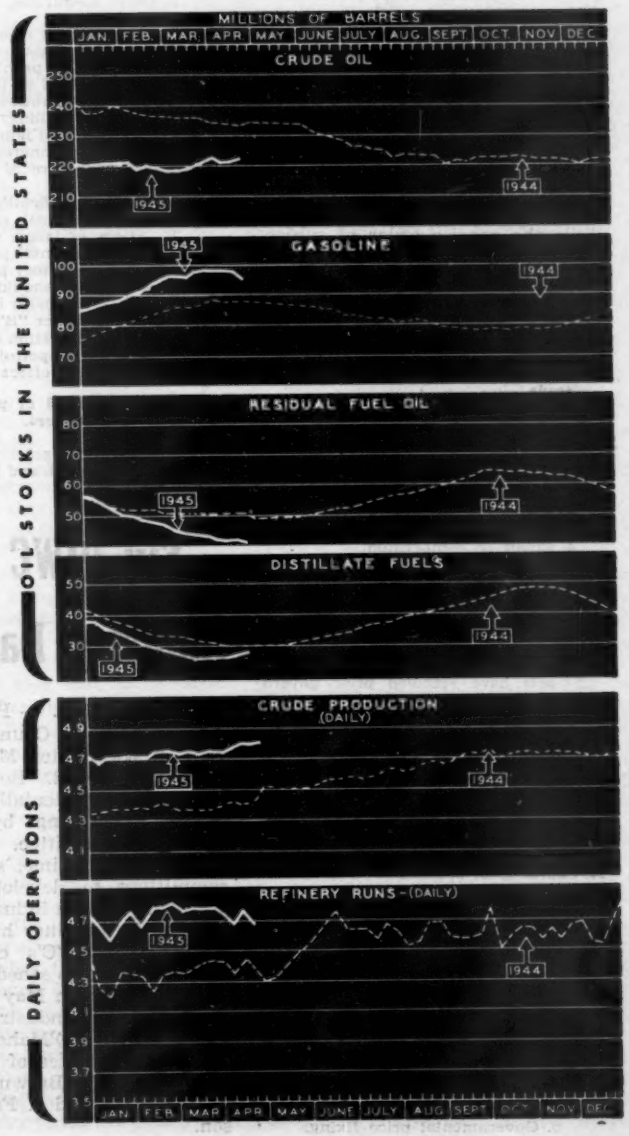
CRUDE OIL PRODUCTION 4,812,000 bbl. as of April 28—up 18,250 bbl. One year ago 4,436,000 bbl.

REFINERY RUNS 4,676,000 bbl. daily week ended April 21—down 94,000 bbl. One year ago 4,443,000 bbl.

OIL men with an eye cocked at international affairs are speculating that ownership of petroleum resources of the Middle East must be a point of strong argument between Soviet, British and United States delegates at the peace and security conference. There is no confirming evidence from San Francisco that this is true but logic gives credence to the speculation. History is packed with proof that petroleum resources long have been one of the primary issues in periods of political and diplomatic reshuffling such as the one now confronting the Allied powers.

THERE has been no understandable reason advanced why Soviet Russia suddenly abandoned its campaign last fall for a share in Iran's prospective petroleum concessions. Decision of the Iranian Government to deny all applications for new petroleum concessions until world affairs become more nearly stabilized probably served to modify Russia's clamor for exploration rights south of the Caspian Sea. But it also seems probable that Russia was given some assurance that her application for Iranian concessions would receive full consideration when bidding was resumed for Middle East oil rights. It would be contrary to everything known of Russian foreign policy to assume that she would be long content with an inconclusive disposition of the issue. Russia already controls most of western Europe's producing fields in Romania, Austria and Poland. Prospect, therefore, that Soviet peace conferees will demand a status equal to United States and British interests in the Middle East assumes worldwide significance from a standpoint of future petroleum operations.

JUST how developing events in the control of Eastern Hemisphere petroleum resources will impinge on the United States industry is not entirely clear. It will depend on whether Russia succeeds in winning concessions in Iran and on whether they prove productive. There is little doubt that Middle East crude oil will become a much more important factor in European supplies than in prewar years. There is also the possibility that with Russia as a full partner in the Middle East crude oil from the Persian Gulf will become a more important factor in affairs of the United States industry than would prevail otherwise.



Cartels Head Subjects Listed for Airing at Committee Hearings

WASHINGTON.—The Special Senate Petroleum Committee will open hearings on May 17, Sen. Joseph C. O'Mahoney, chairman, has announced. Cartels will be the first subject to be taken up, with Attorney General Biddle and Assistant Attorney General Berge among the first witnesses, followed by representatives of the Department of State, Petroleum Administration for War and Federal Trade Commission.

After cartels, testimony on new sources of petroleum will be heard.

The committee, appointed to study the development of a national oil policy, will meet with a subcommittee of the Senate Judiciary Committee, now considering the O'Mahoney bill (S-11) on registration of cartels.

A tentative schedule of subjects has been submitted by Senator O'Mahoney to individuals and organizations of the oil industry, many of whom will appear as witnesses. While the precise order of subjects may be changed, the following breakdowns of major subjects will be taken up.

Outline of Hearings

I. Cartels in relation to petroleum in world trade.
- A. Nature of cartels.
  - 1. Private.
  - 2. State monopolies.
  - 3. Mixed.
- B. History of petroleum cartels.
  - 1. Restriction of production.
  - 2. Allocation of markets.
  - 3. Control of price.
  - 4. Effect on competition.
- C. Extent to which participation in prewar cartels was required in order to do foreign business.
- D. What should Government policy be as to postwar cartels?
  - 1. Should immunity from prosecution under antitrust laws follow where acts have received prior governmental approval?
  - 2. Should immunity be accompanied by governmental regulation of the acts in question, and if so, to what extent?
  - 3. Types of arrangements for which immunity would be expected.

II. Sources of Petroleum in the United States.
- A. Character of petroleum.
  - 1. Liquid.
  - 2. Gaseous.
- B. Location and extent of present reserves of oil and gas; percentage of ownership by American capital; percentage in public lands.
- C. Factors affecting production.
  - 1. Conservation laws and practices as to oil and gas.
  - 2. Connally Hot Oil Law.
  - 3. Interstate Oil Compact.
  - 4. Taxation.
  - 5. Price.
    - a. Industry basis.
    - b. Governmental price fixing.
- D. Subsoil under territorial waters.
  - 1. Bays.
  - 2. Maritime belt.
  - 3. State or federal jurisdiction.
- E. Subsoil under continental shelf.
  - 1. International questions involved.
- F. How may exploration be stimulated (a) on the public domain and (b) in other areas?
  - 1. By relaxation of governmental controls?
  - 2. By affirmative governmental action?
- G. Production methods.
  - 1. Primary.
  - 2. Secondary.
  - 3. Maintenance of stripper wells.
- H. Substitutes for natural petroleum.
  - 1. Shales.
  - 2. Coal.
  - 3. Other substitutes.

III. The independent company.
- A. History and character.
- B. What are the problems incident to the operation of an independent company in exploration, transportation, refining, and selling?
  - 1. Advantages of individual operation.
  - 2. Difficulties inherent in small capital and nature of petroleum business.
  - 3. Artificial difficulties.
    - a. Unintentional effects of operations of larger companies.
    - b. Governmental policies.
    - c. Discriminatory practices.
- C. What could or should be done by the federal Government in respect of any difficulties under "B" above?
- D. History of operation of antitrust laws in relation to petroleum companies.
  - 1. Appraisal of effect of such laws.

IV. Postwar disposal of pipe lines, refineries, and tankers.
- A. Pipe lines.
  - 1. Should government-owned lines be sold or leased, and under what conditions?
  - 2. Or should they continue to be owned by the Government for national defense purposes, and leased to private interests in peace time?
- B. Refineries.
  - 1. Should any preference be given to purchase or lease by smaller companies?
  - 2. Should Government credit be furnished to buyers or lessees?
    - a. To make original purchase or lease.
    - b. Additional capital for modernization purposes.
  - 3. Should there be a maximum limit to the term of a lease?
  - 4. Should any refineries be disposed of to foreign interests?
- C. Tankers.
  - 1. Should unsold tankers be disposed of to foreign companies or governments?
  - 2. Should unsold tankers be scrapped?
  - 3. Should the Government operate a fleet of tankers?

V. Petroleum requirements.
- A. Prewar consumption in United States by products.
- B. Estimated postwar requirements in United States by products.
  - 1. New uses and applications of petroleum.
- C. Estimated world requirements by countries.
- D. Estimated postwar productive capacity by countries.
- E. Movements of petroleum in world trade.
  - 1. U. S. imports and exports.
- F. What should be our policy as to imports and tariffs?
  - 1. Effect on cost to consumer.
  - 2. Effect on domestic industry.
  - 3. Considerations of national defense.

VI. American petroleum interests in foreign countries.
- A. History and extent.
- B. History of diplomatic protection since World War I.
  - 1. Middle East.
  - 2. Netherlands East Indies.
  - 3. Mexico.
  - 4. Venezuela.
  - 5. Other producing countries.
  - 6. Consuming countries.
- C. Reasons for varying degrees of success.
- D. How can diplomatic protection be made more effective?

Six PIWC Committees Will Prepare Industry Data for O'Mahoney Hearings

WASHINGTON. — Petroleum Industry War Council will convene in Washington May 16, Chairman William R. Boyd, Jr., announces, coincidentally with the opening of hearings by the Senate petroleum committee.

At the same time, special PIWC committees to develop plans and procedure for the industry's appearance at the hearings have been approved by PIWC's committee of five and asked to schedule meetings in Washington on May 14 or earlier to prepare the industry's presentation before the O'Mahoney committee. The committee of five includes Boyd, Russell B. Brown, E. Buddrus, J. C. Hunter and J. French Robinson.

In a letter to the special committees, Boyd listed the members of various groups picked to develop special phases of the industry's position and urged chairmen to call on any other oil men not included for help whenever necessary.

The PIWC appointments include:

Cartels in Relation to Petroleum in World Trade.—Orville Harden, chairman, Standard Oil Co. (New Jersey), New York; L. B. Levi, Socony-Vacuum Oil Co., Inc., New York; W. S. S. Rodgers, The Texas Co., New York; P. O. Settle, Gulf Oil Corp., Pittsburgh; Russell B. Brown, Independent Petroleum Association of America, Washington; Harry D. Collier, Standard Oil Co. of California, San Francisco; W. Alton Jones, Cities Service Co., New York.

Petroleum Requirements. — Robert E. Wilson, chairman, Standard Oil Co. (In-

diana), Chicago; Stewart P. Coleman, Standard Oil Co. (New Jersey), New York; Joseph E. Pogue, Chase National Bank, New York; J. French Robinson, American Gas Association, The East Ohio Gas Co., Cleveland; H. J. Struth, Texas-Mid-Continent Oil and Gas Association, Dallas; James V. Brown, Independent Petroleum Association of America, Washington; E. Buddrus, Independent Natural Gas Association, Panhandle Eastern Pipe Line Co., Chicago; Earl W. Wagy, Standard Oil Co. of California, San Francisco; Fred Van Covern, American Petroleum Institute, New York.

Sources of Petroleum Supply.—John M. Lovejoy, chairman, Seaboard Oil Co. of Delaware, Inc., New York; E. Buddrus, Independent Natural Gas Association, Panhandle Eastern Pipe Line Co., Chicago; Ralph T. Zook, Independent Petroleum Association of America, The Sloan & Zook Co., Bradford, Pa.; A. C. Mattei, Honolulu Oil Corp., San Francisco; W. H. Ferguson, Continental Oil Co., Denver; E. DeGolyer, Dallas; J. Edgar Pew, Sun Oil Co., Philadelphia; A. I. Levorsen, Tulsa; Ralph B. Lloyd, Western Oil and Gas Association, Lloyd Corp., Ltd., Los Angeles; Henry Phillips, Sinclair Oil Corp., New York; J. C. Hunter, Mid-Continent Oil and Gas Association, Washington; R. S. Shannon, Pioneer Oil Corp., Denver; Harry C. Wiess, Humble Oil & Refining Co., Houston; Charles F. Roeser, Roeser & Pendleton, Inc., Fort Worth; Walter S. Hallanan, Plymouth Oil Co., Pittsburgh; J. French Robinson, American Gas Association, The East Ohio Gas Co., Cleveland; James Terry Duce, Arabian American Oil Co., San Francisco; George S. Walden, Standard-Vacuum Co., Inc., New York; George A. Hill, Jr., Houston Oil Co. of Texas, Houston.

American Petroleum Interests in Foreign Countries.—Harold F. Sheets, chairman, Socony-Vacuum, New York; Eugene Holman, Standard Oil (N. J.), New York; J. Frank Drake, Gulf Oil Corp., Pittsburgh; A. E. Watts, Sinclair Oil Corp., New York; Don R. Knowlton, Phillips Petroleum Co., Bartlesville, Okla.; H. D. Collier, Standard Oil Co. of California, San Francisco; George A. Hill, Jr., Houston Oil Co. of Texas, Houston; W. Alton Jones, Cities Service Co., New York; W. S. S. Rodgers, The Texas Co., New York; R. H. Colley, The Atlantic Refining Co., Philadelphia; Reese H. Taylor, Union Oil Co. of California, Los Angeles.

The Independent Company.—Ralph T. Zook, chairman, Independent Petroleum Association of America, Sloan & Zook Co., Bradford, Pa.; Maj. B. A. Hardey, Shreveport; Charles F. Roeser, Roeser & Pendleton, Inc., Fort Worth; C. L. Henderson, Western Petroleum Refiners Association, The Vickers Petroleum Co., Inc., Wichita; Harry A. Logan, National Petroleum Association, United Refining Co., Warren, Pa.; B. L. Majewski, Deep Rock Oil Corp., Chicago; Lee S. Wescoat, The Pure Oil Co., Chicago; M. H. Robineau, Frontier Refining Co., Cheyenne, Wyo.; C. P. Watson, Oil Producers Agency of California, Seaboard Oil Co. of Delaware, Inc., Los Angeles; L. L. Aubert, Bankline Oil Co., Los Angeles; Maston Nixon, Texas-Mid-Continent Oil and Gas Association, Southern Minerals Corp., Corpus Christi, Tex.; O. D. Donnell, The Ohio Oil Co., Findlay, Ohio; C. C. Herndon, Skelly Oil Co., Tulsa; E. Buddrus, Independent Natural Gas Association, Panhandle Eastern Pipe Line Co., Chicago; T. H. Barton, Lion Oil Refining Co., El Dorado, Ark.; Frank M. Porter, Kansas-Oklahoma Mid-Continent Oil and Gas Association, Fain-Porter Drilling Co., Oklahoma City; A. S. Ritchie, D. R. M. Co., Wichita; Dana Hogan, San Joaquin Valley Oil Producers Association, Hogan Petroleum Co., Los Angeles; Van S. Welch, Flynn, Welch & Yates, Artesia, N. M.; N. W. Shiarella, Kentucky Oil and Gas Association, Owensboro; A. W. Peake, Standard Oil Co. (Indiana), Chicago; K. S. Adams, Phillips Petroleum Co., Bartlesville, Okla.; John R. Suman, Standard Oil Co. (New Jersey), New York; B. Brewster Jennings, Socony-Vacuum Oil Co., Inc., New York; Merle H. Becker, W. C. McBride & Co., St. Louis.

Postwar Disposal of Pipe Lines, Refineries and Tankers.—W. Alton Jones, chairman, Cities Service Co., New York; W. S. S. Rodgers, The Texas Co., New York; Sidney A. Swensrud, Standard Oil Co. (Ohio), Cleveland; J. R. Parten, Premier Refining Co., Houston; J. Howard Pew, Sun Oil Co., Philadelphia; Orville Harden Standard Oil Co. (N. J.), New York; Hines Baker, Humble Oil & Refining Co., Houston; John Newton, Magnolia Petroleum Co., Beaumont, Tex.; B. I. Graves, Tide Water Associated Oil Co., New York; Robert H. Colley, The Atlantic Refining Co., Philadelphia; C. S. Jones, Richfield Oil Corp., Los Angeles; Fayette B. Dow, Washington; Clark H. Kountz, Sinclair Oil Corp., New York; T. E. Swigart, Shell Pipe Line Corp., Houston; C. H. Kunze, Socony-Vacuum Oil Co., Inc., New York; G. L. Rowsey, Taylor Refining Co., Taylor, Tex.; E. Buddrus, Independent Natural Gas Association, Panhandle Eastern Pipe Line Co., Chicago; J. French Robinson, American Gas Association, The East Ohio Gas Co., Cleveland; Jake L. Hamon, Cox & Hamon, Dallas; W. L. Stewart, Jr., Union Oil Co. of California, Los Angeles.

Industry Committee to Coordinate Work of the Foregoing Six Committees.—A. Jacobsen, chairman, Amerada Petroleum Corp., New York, and the chairman of each committee.

Congressional Aid Looms in Fight to Retain Intangible-Deduction Benefits

WASHINGTON.—The way was paved this week for strongest congressional backing for legislation to offset the decision of the Fifth Circuit Court of Appeals on the intangible drilling costs option if congressional action is subsequently found necessary.

Though a dozen previous measures had been offered in Congress in an effort to maintain the present regulations of the Internal Revenue Bureau on the option, evidence that House leaders will move speedily to invalidate the decision if it becomes final was seen in the introduction of a new resolution by Chairman Robert Doughton of the House ways and means committee.

Doughton, who seldom offers a bill which he does not intend to press for enactment, said that he had sponsored this resolution at the request of Speaker Sam Rayburn, of the House.

This joint move on the part of the two most influential leaders in the House served warning that Congress is prepared to act promptly should the Circuit Court refuse to reconsider the case and its decision is appealed to the United States Supreme Court.

In the form of a concurrent resolution, the Doughton measure would not require the signature of the president. While this would deprive it of full status as law, it would represent the stated policy of Congress and would be given fullest consideration by the Supreme Court in making its final decision. While records are not available, it is doubtful that the high tribunal has ever disregarded such a resolution by Congress in the past when deciding a case involving legislative intent.

Text of the short Doughton resolution follows:

"That in the public interest the Congress hereby declares that by the reenactment, in the various revenue acts beginning with the Revenue Act of 1918, of the provisions of Section 23, of the Internal Revenue Code and of corresponding sections of prior revenue acts allowing a deduction for ordinary and necessary business expenses, and by the enactment of the provisions of Section 711 (B) (1) of the Internal Revenue Code relating to the deduction of intangible drilling and development costs in the case of oil and gas wells, the Congress has recognized and approved the provisions of Section 29.23 (M) 16 of Treasury Regulations 111 and the corresponding provisions of prior treasury regulations granting the option to deduct as expenses such intangible drilling and development costs."

Senate May Reinstate Synthetic-Fuel Budget

WASHINGTON.—The Senate will be asked to reinstate a $7,000,000 cut in the 1946 Bureau of Mines appropriation for synthetic-fuel development and experimentation. The budget bureau's $13,000,000 estimate was slashed by the appropriations committee to $6,000,000, and the cut was sustained on the floor of the House.

For 1945, $5,000,000 was appropriated of the $30,000,000 earmarked for a 5-year program approved last year.

Bureau of Mines plans for the coming fiscal year include building an oil shale plant and one or two hydrogenation plants for active development work. In the smaller budget, the program would be held to a laboratory basis.

Considerable support has been rallied in the House and Senate for a larger 1946 budget.

Hugoton Classified as "Restricted Area," Curbing New-Well Drilling

NEW drilling, excluding wells specifically authorized as exceptions, was banned this week in the Hugoton gas field of Kansas and Oklahoma. The prohibition on new drilling was invoked by the Petroleum Administration for War which designated the Hugoton pool as a "restricted area", effective May 1.

The restricted order issued by the PAW District 2 office over the signature of E. J. Bullock, director in charge, prevents operators from using materials for starting new wells after date of the classification determination.

Petroleum Administrative Order 11, the industry's general regulation limiting the utilization of materials, provides in Section C:

1. No material may be used to drill or complete any well in a "restricted area" or to drill any well for condensate in a discovered field, unless: (i) drilling was commenced prior to the designation of the area as a "restricted area" and conforms to the applicable provisions of Petroleum Administrative Order 11 or to a specific exception heretofore granted authorizing the drilling and completion of the well; or (ii) drilling is authorized by a specific exception or other grant of authority as provided for by paragraph (m). (Paragraph M sets up methods for applying for exceptions and provides machinery for removing the restricted classification).

The Hugoton pool, defined by the PAW restricted order as embracing Stevens Morton Seward, Stanton, Grant, Haskell, Kearney and Finney counties, Kansas, and Texas County, Oklahoma, contains about 420 producing wells. Completions have been averaging about 10 per month on a spacing pattern of one well to 640 acres. There are about 10 completed wells in the field currently unconnected and pool allowable is around 7,065,105,000 cu. ft. per month.

Northern Natural Gas Co., Panhandle Eastern Pipe Line Co., United Carbon Co., and Kansas-Nebraska Natural Gas Co., Inc., are the largest pipe line and purchasing companies in the Hugoton field. Plans are under discussion for construction of a 26-in. line to the Pacific Coast, although this project has been generally branded as a postwar program with scant chance for approval while materials remain critical.

The Hugoton action is the result of the current shortage of drilling materials, PAW officials said.

More wells than were regarded as necessary at this time were either being drilled or proposed in the Hugoton area, thus throwing out of balance essential drilling operations in other fields as a result of the materials shortage.

The move is considered a temporary measure and will be lifted when the materials situation eases. Until further notice, however, there will be no more drilling in the area except by approval of PAW. Approval must be obtained for each individual operation, PAW said.

Requests for drilling should be directed to the district director in charge, PAW District 2, 624 South Michigan Avenue, Chicago.

James E. Pew Receives Hanlon Award

THE Hanlon award, highest honor in the natural gasoline industry and one of the ranking merit awards in the petroleum industry, was conferred here May 2 on James E. Pew, director, Natural Gas-Natural Gasoline Division, Petroleum Administration for War, Washington. The ceremony took place at the annual meeting of the board of directors of the Natural Gasoline Association of America, a meeting held in lieu of the usual national convention. The convention was cancelled in accordance with the request of national war agencies.

Pew is the ninth recipient of the Hanlon award which is conferred each year by the N.G.A.A. for outstanding meritorious service to the natural gasoline and condensate industries.

JAMES E. PEW

Presentation was made by James W. Vaiden, Tulsa, vice president of Skelly Oil Co., and N.G.A.A. president, at the luncheon for directors. The citation read in part: " . . . his untiring efforts in coordinating the wartime activities of the natural gasoline and condensate industries with those of the entire oil program; his continued and forceful advocacy of a broader use of the products of the industries in the manufacture of critically need war materials; and the effective manner in which he stimulated and directed the production and distribution of products for which there was the most pressing need, not only resulted in a great contribution to the total war effort but brought a new realization to the industries he represented of their own potentialities."

Pew is a native of Pittsburgh, Pa., where he received his elementary education. Later he attended Cornell University and Massachusetts Institute of Technology. On graduation in 1923 he was employed by the United Natural Gas Co., Bradford, Pa. From 1924 to 1926 he was employed by the Hope Construction & Refining Co., for which he worked in the Mellon Institute on research and development studies in connection with natural gasoline and liquefied petroleum gases. In 1926 he became associated with the Virginian Gasoline & Oil Co., of Charlestown, W. Va., where he advanced to superintendent of operations and later was also made manager of Viking Distributing Co., a subsidiary organization. He was serving in this dual capacity early in 1942 when he was called to Washington as a member of the Production Division of PAW. When the Natural Gas-Natural Gasoline Division was formed in June 1942, Pew was made chief of the Natural Gasoline section, and in July 1943 he became assistant director of the division. In November 1943 he was appointed director of the division, in which capacity he is now serving.

Home-Heating Oils to Be Heavier Next Winter

WASHINGTON. — Home - heating oils for the coming winter are expected to be of a heavier grade, Deputy Petroleum Administrator Ralph K. Davies said this week. Predicting increased demand for lighter oils for diesel use. Navy needs for diesel oil are at an all-time high, Davies said, and are scheduled to reach higher levels in the war against Japan.

Cracked oil, remaining from the manufacture of aviation gasoline, will provide the major source of home heating oils next winter, Davies indicated.

THIS WEEK

VE-DAY—O'Mahoney committee to start hearings May 17 on postwar disposal of independent-company pipe lines; sources of petroleum; American interests in foreign countries; tankers, refineries, etc. . . . ¶House committee cuts appropriation for synthetic-fuel program from $12,000,000 to $6,000,000. . . . Says Bureau of Mines "should begin to readjust itself for one-front war." . . . Same committee cuts funds for petroleum division of the interior from $209,000 to $173,212. . . . Move launched to reinstate full appropriation for synthetic-fuel experiments. . . . ¶PAW takes initial steps to relieve Allied military forces of responsibility for meeting civilian oil needs in North Africa. . . . Also asks foreign operations committee of oil industry to help in handling petroleum supplies for civilian Europe. . . . ¶Acute shortage of fuels and trucks foreseen in devastated areas. . . .

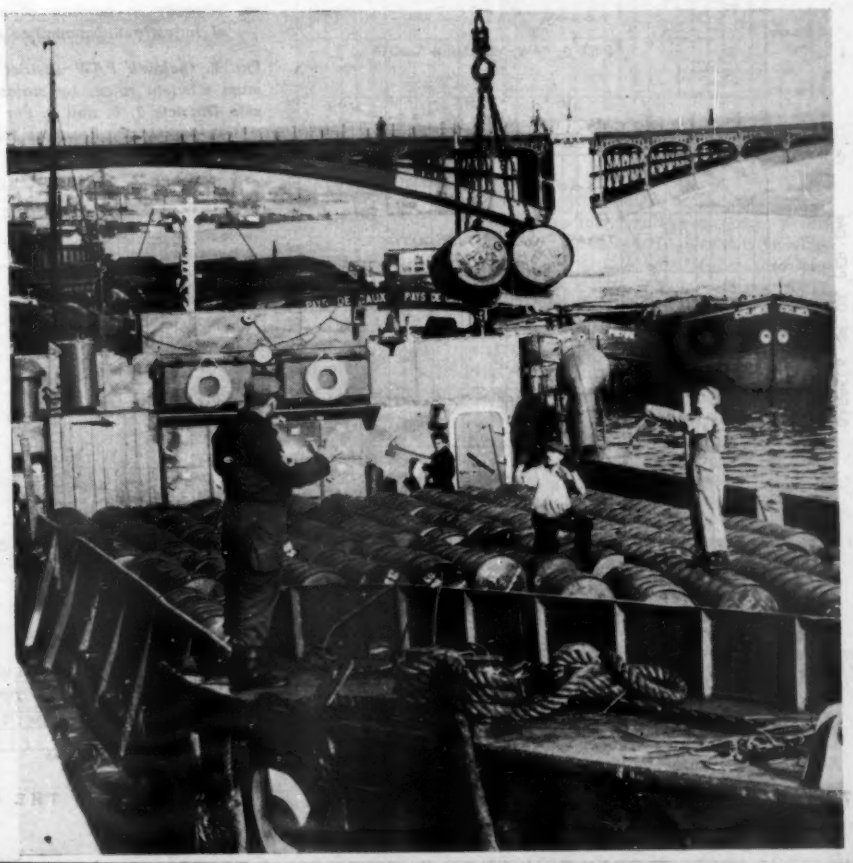
TIRES—Tomorrow's motor transportation depends on care of today's tires, Director Johnson, of ODT, warns. . . . Addresses letter to nation's trucking operators, urging intensified conservation. . . . Mustn't let "one tire-mile be lost through careless or wasteful operation." . . .

WASHINGTON—Congressional backing organized for concurrent resolution introduced in House declaring it stated policy of Congress to grant deduction of intangible drilling costs for taxation purposes. . . . Designed to neutralize recent Circuit Court ruling. . . . Supreme Court traditionally accepts such action as indicating legislative intent. . . . ¶Department of Agriculture specialists say rubber production from native plants in Florida unpromising. . . . Everglades rubber project, advocated for returning veterans, would be hazardous. . . . Couldn't compete with tropical areas. . . .

REFINING—Royal Dutch group to build $48,000,000 refinery in Venezuela. . . . Fulfills promise to increase its refining capacity beyond present 40,000 bbl. daily. . . . That country's program believed to assure ultimate minimum daily refining capacity of 237,000 bbl. . . . ¶Because of tank-car scarcity PAW orders refiners to limit manufacture of asphalt and road oils to 22 grades. . . . Ordinarily make 55 to 60. . . . ¶Notwithstanding extremely tight transportation situation PAW manages to build up Atlantic seaboard gasoline stocks to meet normally heavy seasonal demand. . . . ¶Experts say West Coast refiners will have to import crude by tanker to meet normal peacetime demands within 5 or 6 years.

TRANSPORTATION—WPB allocates 5,500 tons of carbon steel for barges and towboats on inland waterways for second quarter, in addition to 14,077 tons previously assigned. . . . ¶ODT says private motor carriers, though hauling larger tonnage than ever, are operating at mileage savings of about one-third over 1941. . . . Ascribed to voluntary conservation efforts of carriers themselves and reduction of 25 per cent in mileage required by ODT order. . . .

PRODUCTION—Elk Hills Naval Reserve output reaches maximum authorized by Congress. . . . Development 2½ months ahead of schedule. . . . In 10 months 236 wells completed. . . . Teamwork of Navy, oil companies, contractors credited with effecting this addition to Navy's fuel resources. . . . ¶Nation's crude output hits all-time high of 4,812,000 bbl. daily. . . . Exactly 900 bbl. below Bureau of Mines estimate of May daily demand. . . . Oklahoma chief contributor to total with gain of 16,200 bbl. . . . Illinois and Kansas slipped a little. . . . ¶West Texas fields at maximum efficient production in May for second straight month. . . . Last area to be brought to maximum efficiency. . . . ¶Venezuela's production in 1944 increased 43 per cent over previous year.



A U. S. Navy craft, one of the first to make a trip up the Seine River to Paris, discharges its cargo of oil at the Quai D'Ivry. Petroleum traffic with liberated European countries is being returned to normal as quickly as arrangements can be made

Signal Corps Photo from Acme

District 3 Fields Undamaged by Record Wartime Withdrawals of Crude

by Charles J. Deegan

THE release of May production quotas by the Petroleum Administration for War, showing that District 3 is again expected to produce at the same all-time high rate as in April, 2,768,000 bbl. per day of crude, raises the question of whether this can be done without permanent harm to the fields.

There is no doubt that the assigned volume of crude will be forthcoming, because the attitude of the industry and the state regulatory bodies is that whatever crude is needed to win the war shall be provided, regardless of consequences. Nevertheless, with V-E day obviously just around the corner, the national interest in this natural resource justifies something more than an emotional reaction.

The answer is that to date no permanent damage has been done to any field in District 3 as a result of the wartime requirements for crude. Current PAW quotas are pushing against the ceiling of the district's capacity to produce efficiently. But given sufficient steel and manpower to sustain the drilling program, preferably at an even higher rate than at present, these quotas can be maintained for another 6 months without serious harm.

The District 3 Production Committee has a subcommittee on Reserves and Development, generally known as "the Ivy committee", because John S. Ivy has been chairman since its inception. This committee makes periodic studies of the maximum efficient rate of production of all fields in District 3, and has made a total of five reports at approximately 6-month intervals, the first one dated October 1, 1942, the latest on March 24, 1945.

Since production has conformed very closely with the PAW monthly crude quotas, it is possible to chart the history of the war demand for crude and its relationship to District 3 capacity to produce at maximum efficient rates. This is illustrated in Fig. 1, where the Ivy committee's determination of capacity to produce at maximum efficient rates is compared to the PAW monthly crude quotas.

Fig. 1 shows that since January 1943 practically all of the excess capacity to produce at maximum efficient rates has been concentrated in Texas. All other states combined in District 3 have been producing at, or above, the estimated maximum efficient rates since early 1943.

However, from a practical standpoint, it is doubtful if any particular harm has been done to these fields, at least as a result of the war

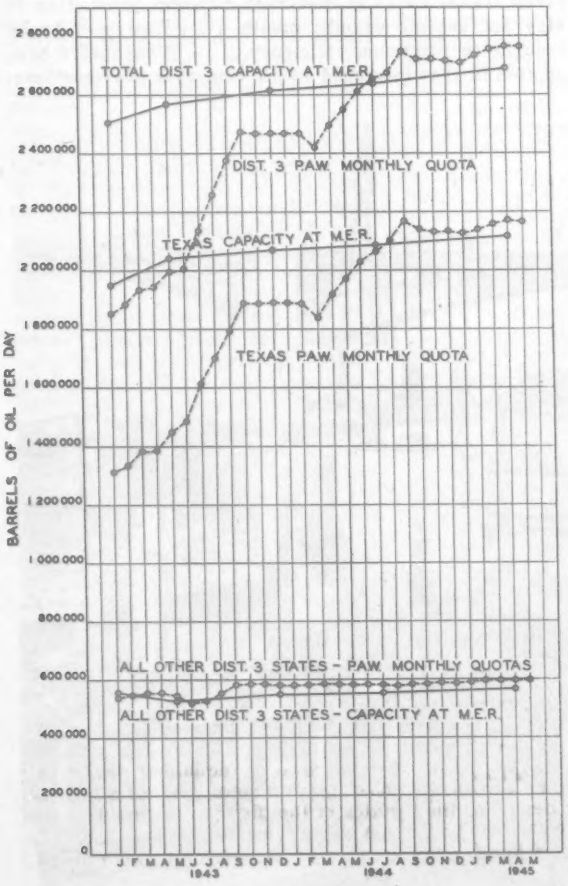
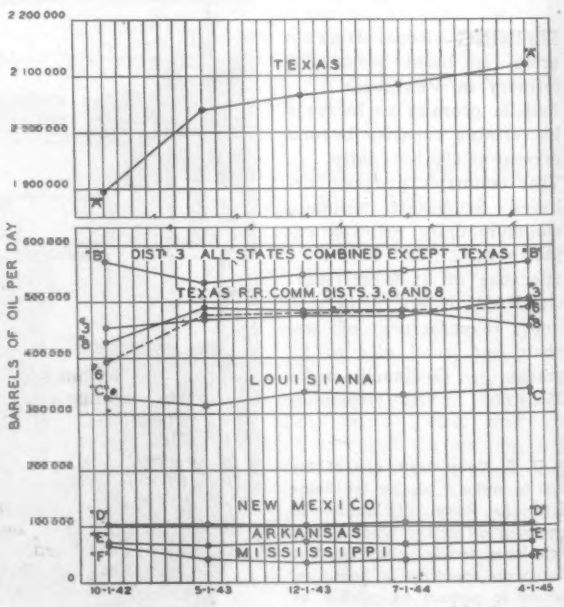

TOTAL DIST 3 CAPACITY AT M.E.R.
DIST. 3 P.A.W. MONTHLY QUOTA
TEXAS CAPACITY AT M.E.R.
TEXAS P.A.W. MONTHLY QUOTA
ALL OTHER DIST. 3 STATES - P.A.W. MONTHLY QUOTAS
ALL OTHER DIST. 3 STATES - CAPACITY AT M.E.R.
BARRELS OF OIL PER DAY
2 800 000
2 600 000
2 400 000
2 200 000
2 000 000
1 800 000
1 600 000
1 400 000
1 200 000
1 000 000
800 000
600 000
400 000
200 000
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M
1943
1944
1945

Fig. 1 (left): Comparison District 3 PAW monthly crude quotas vs. capacity to produce at maximum efficient rates. Per data of Industry Subcommittee on Reserves and Development

Fig. 2. (below): PAW District 3's capacity to produce at maximum efficient rates; by states, and for Texas Railroad Commission Districts 3, 6, and 8. Per data of Industry Subcommittee on Reserves and Development



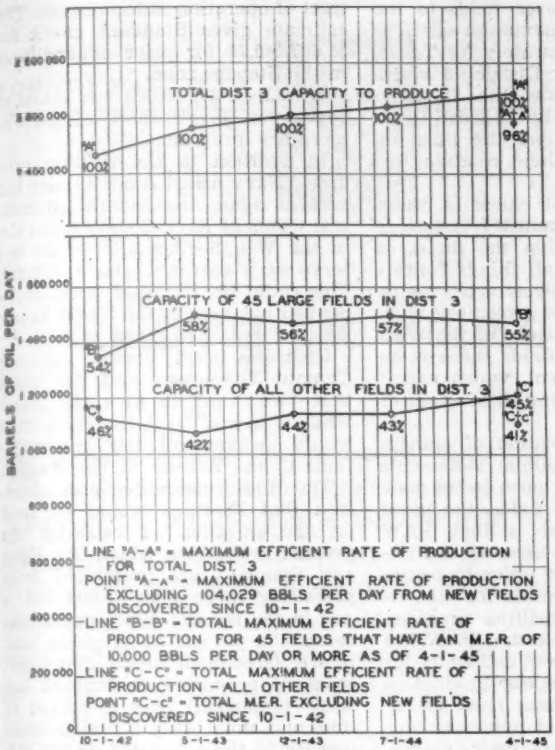

TOTAL DIST 3 CAPACITY TO PRODUCE
100%
100%
100%
100%
100%
96%
CAPACITY OF 45 LARGE FIELDS IN DIST 3
54%
58%
56%
57%
55%
CAPACITY OF ALL OTHER FIELDS IN DIST. 3
46%
42%
44%
43%
45%
41%
BARRELS OF OIL PER DAY
LINE "A-A" = MAXIMUM EFFICIENT RATE OF PRODUCTION FOR TOTAL DIST. 3
POINT "A-a" = MAXIMUM EFFICIENT RATE OF PRODUCTION EXCLUDING 104,029 BBLS PER DAY FROM NEW FIELDS DISCOVERED SINCE 10-1-42
LINE "B-B" = TOTAL MAXIMUM EFFICIENT RATE OF PRODUCTION FOR 45 FIELDS THAT HAVE AN M.E.R. OF 10,000 BBLS PER DAY OR MORE AS OF 4-1-45
LINE "C-C" = TOTAL MAXIMUM EFFICIENT RATE OF PRODUCTION - ALL OTHER FIELDS
POINT "C-c" = TOTAL M.E.R. EXCLUDING NEW FIELDS DISCOVERED SINCE 10-1-42
10-1-42
5-1-43
12-1-43
7-1-44
4-1-45

Fig. 3 (above): PAW District 3's capacity at maximum efficient rates of production: comparison of total vs. 45 large fields vs. all other fields. Per data of Industry Subcommittee on Reserves and Development

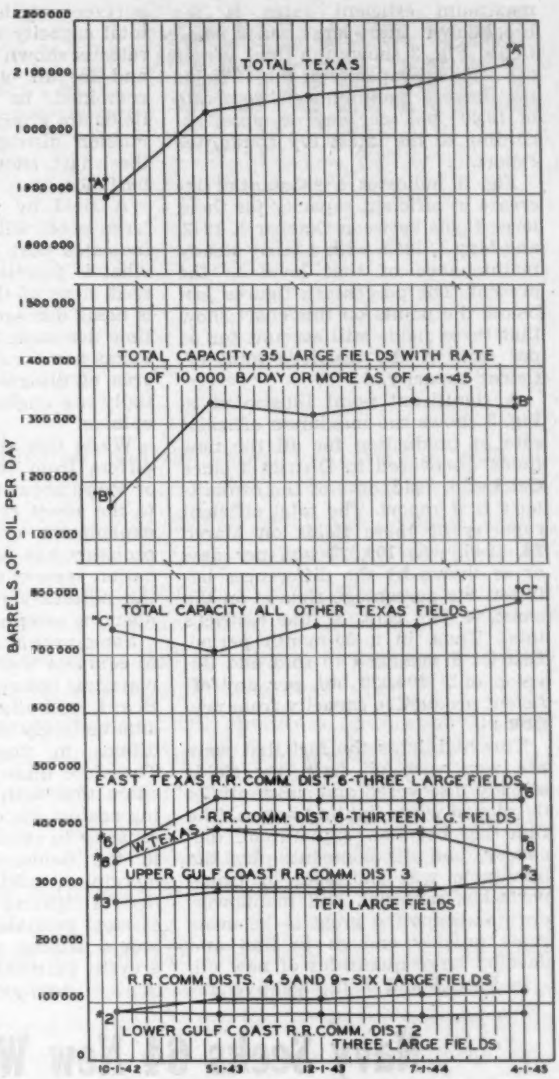

TOTAL TEXAS
TOTAL CAPACITY 35 LARGE FIELDS WITH RATE OF 10 000 B/DAY OR MORE AS OF 4-1-45
TOTAL CAPACITY ALL OTHER TEXAS FIELDS
EAST TEXAS R.R.COMM. DIST. 6-THREE LARGE FIELDS
R.R. COMM. DIST 8-THIRTEEN L.G. FIELDS
W. TEXAS
UPPER GULF COAST R.R.COMM. DIST 3
TEN LARGE FIELDS
R.R. COMM. DISTS. 4,5 AND 9 - SIX LARGE FIELDS
LOWER GULF COAST R.R.COMM. DIST 2
THREE LARGE FIELDS
BARRELS OF OIL PER DAY
10-1-42
5-1-43
12-1-43
7-1-44
4-1-45

Fig. 4 (right): Analysis of Texas' capacity to produce at maximum efficient rates. Per data of Industry Subcommittee on Reserves and Development

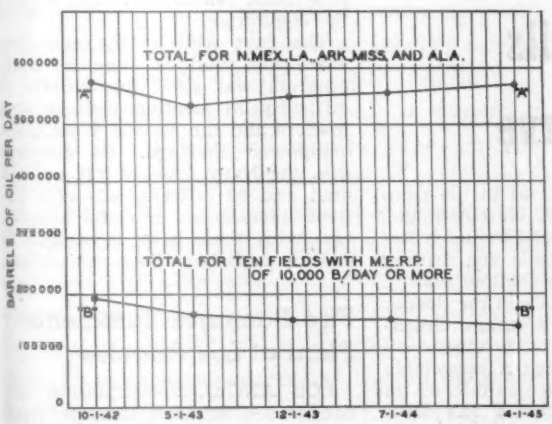


Fig. 5 (below): PAW District 3 less Texas. Comparison of total capacity at maximum efficient rates of production, 10 large fields vs. total

demands. Sound conservation practices and engineering principles were not universal before the war; nor are they 100 per cent effective everywhere today. The Ivy committee is fully cognizant of this as a practical and realistic matter and takes it into account in arriving at maximum efficient rates for individual fields.

Furthermore, most of the committee members, recognizing the natural tendency of technical men to conservative estimates, will concede that their figures on maximum efficient rates can be exceeded, in some cases, perhaps 5 per cent for a 6-month period without harm.

All things considered, while the combined crude quotas for states other than Texas, have consistently exceeded the estimated maximum efficient rate by 25,000 to 30,000 bbl. daily for many months, no additional damage has been done to the fields concerned.

In Texas, on the other hand, excess capacity to produce at maximum efficient rates existed from the beginning of the war up to August 1944. However, the steady increases in crude quotas set by PAW have closed the gap, at first slowly, then later with a rush that finally put the crude quotas over the estimated maximum efficient rate in August 1944 and have kept it there consistently ever since. This excess has been relatively small, and so far has been well within the 5 per cent margin of safety that many people consider inherent in the committee's calculations.

Fig. 2 illustrates how Texas dominates the totals for District 3, showing that each of three of that state's regions exceeds any other state total, in fact any one of the three comes close to equalling the total maximum efficient rate for all other states in the district combined.

A second approach to a study of District 3 capacity to produce at

maximum efficient rates is the breakdown into large and small fields. Fig. 3 shows the total versus the efficient capacity of the 45 fields that have a maximum efficient rate of 10,000 bbl. per day or more, according to the latest Ivy committee report.

Fig. 3 indicates a substantial increase in efficient capacity for these large fields between October 1, 1942, and May 1, 1943, with a fairly steady maintenance of that level to the present. The percentage figures just below the points on this chart show that these fields still account for 55 per cent of the district's total efficient capacity.

A significant point illustrated in Fig. 3 shows the maximum efficient rate of production for all the new fields discovered in District 3 since October 1, 1942, date of the committee's first report. The total efficient capacity of these fields on March 24, 1945, was 104,029 bbl. per day. or as shown by the differences between the percentage figures on the chart, 4 per cent of the district's total. Thus, in a 30-month period, District 3 managed to find and develop only 104,029 bbl. per day efficient productive capacity from new fields.

This highlights the fact that wars are won with oil from the fields already discovered and substantially developed when fighting begins. The time lag between exploration, discovery, and development, plus the inevitable war shortages of transportation, material, and manpower, are handicaps too great to be overcome quickly enough to find and develop large quantities of new oil.

In Figs. 4 and 5, the relative importance of the large fields to the total capacity at maximum efficient rates is shown separately for Texas, and for all other District 3 states combined. In Texas the 35 large fields are grouped by Railroad Commission districts, and the lines on the chart show their relative importance.

A field by field check of these large pools with industry engineers indicates that within the limits of what is practical, all things considered, none of the sweet crude fields is being damaged as a result of wartime demands. On some of the West Texas sour crude fields there is an area of disagreement, which essentially are engineering differences of opinion.

While this summation of opinion differs from the public statements of PAW about the harm being done to the sweet crude fields, the usual explanation offered is that PAW probably has to exaggerate the situation somewhat in order to secure the necessary materials for the industry's essential drilling program.

Some people argue that PAW has to compete with rival claimants for materials before the War Production Board, and that these rival claimants certainly do not minimize conditions in pressing their claims. Therefore these people take the position that with crude quotas pushing against the ceiling of District 3's capacity to produce without damage to the fields, with absolutely no margin of safety, PAW was justified in fighting hard for every ton of steel possible, in order to maintain a drilling program that would prevent permanent harm to the nation's oil resources.

Navy Seeks 64 New Wells In Elk Hills Naval Reserve

WASHINGTON.—Another Pacific war 15 years from now would find California crude-oil production down to one-third the area's maximum refinery capacity, the Navy told the House naval affairs committee in justifying a request to expand exploration in Elk Hills Naval Reserve.

Navy oil experts now estimate that production rate will start declining this year and, within 5 or 6 years, oil will have to be imported to the West Coast refineries by tanker to meet normal peacetime demands. If California's present production rate of 900,000 bbl. a day drops, in 15 years, to 300,000 bbl. a day, another war would create a serious national emergency unless additional reserves are located.

Two development projects were submitted for approval to the committee by Capt. W. G. Greenman, director of the Naval Petroleum Reserves. The first calls for drilling 40 new wells in the shallow zone of Elk Hills and 24 wells in the deeper Stevens zone. This program, Greenman said, would provide the necessary data from which a reasonable estimate of total recoverable oil in the productive zones of Elk Hills could be made.

The estimated cost of drilling the 64 wells at $60,000 each in the shallow zone and $250,000 each in the Stevens zone, would be $8,400,000. Of this, the Navy would provide $7,515,711.70, and Standard Oil Co. of California $884,288.30, the division determined on present percentage participation of Navy and Standard under the unit-plan contract of operation in the reserve. The estimate gives Standard credit for $1,607,140.73 for prior expenditures in the Stevens zone.

A total of $7,520,000 was asked to cover the Navy's share of the exploratory program.

In addition to the drilling program, Navy asked funds to buy the surface rights and shallow-oil mineral rights of Kern County Land Co. in the W½ Section 31T in the reserve at a cost not above $50,000. This could be allocated from unexpended balances of the Naval Emergency Fund, Greenman said.

Chairman Carl Vinson, assuring Captain Greenman and his aides that "we want to give the Navy what it needs," said the committee would recommend the appropriations to the Bureau of the Budget.

The House committee also promised that hearings would be held on the question of relaxing the present law under which the Navy and Standard are prohibited from producing more than 65,000 bbl. a day in the reserve. Since operations cannot be cut off at precisely that figure, Greenman urged that operators be permitted to average out daily production over a period of time and thus bring actual production up to the permitted 65,000-bbl. level.

Reporting on progress of the expanded program now in progress under the Navy-Standard unit-plan contract, Greenman said that 230 producing wells have been drilled in the area. Only three dry holes were drilled, he said. In operation at the accelerated scale approved last June 28 for less than a year, an average of 62,000 bbl. daily has now been reached, Greenman told the committee.

The first well of the new program was spudded June 29. Early progress was slow, due chiefly to difficulty in locating drilling contractors and the serious West Coast manpower shortage. To alleviate this, the Navy brought 221 enlisted men and 32 officers, all with oilfield experience, into the reserve, and with their help 19 strings of drilling tools have been maintained.

Fire Damages Butadiene Plant at Los Angeles

LOS ANGELES.—Explosion and fire caused $200,000 damage April 25 to the Defense Plant Corp.'s $20,000,000 butadiene works here.

E. S. Bodine, plant manager who made the damage estimate, said the blast probably was caused by a gas leakage ignited by nearby boilers.

The plant is operated by the Shell chemical division of the Shell Oil Co., Inc. The damage, Bodine said, would not interrupt production more than 24 hours.

FOUNDED IN 1910

BY PATRICK C. BOYLE

the OIL AND GAS JOURNAL

Building the Peace

ALL but a small part of the world's population, under the leadership of the United Nations, is now giving serious thought to what must be done to assure sustained peace after this greatest of all conflicts is ended. Interest centers in the sessions of the San Francisco conference, where world political leaders expect to establish the base on which a sound international structure will be built.

The petroleum industry can aid in the building of that structure. No business has more to offer in establishing peaceful relations between nations nor does any enterprise have more at stake in the success or failure of world plans now in their formative state.

Competent observers agree that the real test of what can be done in avoidance of things which lead to major wars will come when economic questions arise in the postwar period. The science of making a living will be as controlling in what peoples elsewhere are willing to do in support of peace as it will be in this country. Freedom from want and a generally higher standard of living are not the least of the cornerstones of future peace.

No other industrial or trade group has so intimate and wide a knowledge of what is required to expand and balance a world economy as have oil companies engaged in international commerce. They have gone wherever oil was to be found. Finding and producing crude oil, however, have just been the start.

The global aspects of petroleum become more apparent when the refining and distributing phases are considered. Oil companies have cooperated with other countries in establishing refining capacity to supply their requirements.

Consumption of petroleum is now practically universal, and the varied marketing services of this industry have been made available regardless of how remote or how small the demand. Operators have carried on business with all classes of petroleum consumers everywhere.

Much is being said in the press and on the air to the effect that all peoples, regardless of racial, social, or economic differences, must learn to get along together. Oil operators have come a long way in accomplishing that objective.

They have adapted their activities to the customs and cultures of countries in which they operate. They have taught nationals the techniques of petroleum. Wage scales have been advanced. Modern housing, schools, hospitals, transportation and all the other advantages that mark living at its best have been introduced for the first time in many sections of the world. Where feasible to do so, nationals have been made partners in the ownership and management of oil enterprises.

Then there is the fact that expansion of petroleum consumption over a large part of the world will be necessary if the objectives of Allied postwar plans are to be carried out. Better living standards for most of the world's population are inconceivable without a much greater utilization of oil power, light, and heating. Petroleum distributors know first hand what this problem is, and in the past have often pioneered in the introduction of equipment to aid industrial and agricultural development.

In brief, the oil industry has the product and the "know how" of economic activities which make for satisfactory relations between nations. This fact is certain to be of major importance as peace plans move from the conference table to the fields of application.

INTERNATIONAL

Four Venezuelan Wells Near Completion Stage

Socony Vacuum Oil Co. of Venezuela is nearing completion stage on four wells in the San Joaquin and Oficina areas of Venezuela while drilling is progressing on a wildcat operation in the western llanos. Socony Vacuum 12 Guario, San Joaquin area, is drilling and coring at 7,074 ft. In the Oficina area, Socony Vacuum 5 Guico is testing at 7,042 ft.; 7 Guico is completing at 7,001 and 8 Guico is squeezing at 7,003 ft. The western llanos operation, 1 San Vincente, is drilling at 7,072 ft.

Plans Adopted to Develop China's Oil Reserves

Transportation of materials for drilling oil wells and for increasing refinery capacity within China will be expedited by opening of the Ledo-Burma (Stilwell) Road into Asia. This statement, made in Washington last week by Ralph K. Davies, deputy petroleum administrator, offically confirmed previous nebulous information on development of commercial producing fields in China and meager reports on preparations to make full use of Oriental petroleum supplies in concentrating Allied military power against Japan.

Security prevents revealing the extent of United States assistance and the increase in production and refining capacity that will result from installation of the new equipment, Davies added, because all of the finished products will be used for military purposes.

The Petroleum Administration for War, working in cooperation with other war agencies of the United States and with representatives of the Chinese Government, anticipated the opening of the Stilwell Road to such an extent that some of the new material has already been delivered to ports of Asia and is ready to be moved into China now.

"The oil field materials and equipment will make possible more efficient, and possibly greater, crude-oil production in China," Davies said. "The refinery equipment will augment the present simple processing units that were made in China, will increase the quality and quantity of products now being manufactured, and will also permit the production of other petroleum products that cannot be made in existing units."

Davies pointed out that since the closing of the old Burma Road by the Japanese in 1942, only a trickle of supplies of industrial equipment has been moved into China because materials of all kinds, including munitions, which had top priority, had to be hauled by air transport.

Whatever petroleum has been produced and refined in China to date has been made with the assistance of only an extremely small supply of materials from the outside, he said.

Shell Picks Site for Venezuelan Refinery

The Royal Dutch-Shell group will build a 160,000,000 bolivar ($48,000,000) refinery, at Paraguana in western Falcon State, it was announced in Caracas, Venezuela, by J. H. Loudon, general manager for the companies.

The expansion is in accordance with an agreement with the Venezuelan Government, signed in February, 1943, to increase its refining capacity in Venezuela over the present 40,000-bbl. daily mark.

French Refinery Men Inspect Coastal Plants

Refining operations in the Texas and Louisiana coastal area have been inspected during the past few days by two high officials of the Compagnie Francaise du Raffinage.

Rene Perrin, president, and Pierre Laurent, operations manager of the company, both with headquarters in Paris, spent several days in this area inspecting refineries.

Perrin and Laurent were particularly interested in developments made in the refineries since the outbreak of the war in that it will be necessary to make certain improvements in the oil refineries in France

We Would If We Could!

Mechanical conditions make it impossible for the Journal to publish the Table of Contents facing the inside front cover as many readers have suggested. We aren't just stubborn nor are we unmindful of the convenience such arrangement would afford. Neither can we print the page number on which the Table of Contents appears on the front cover because of mechanical considerations. The best we can do, and we have been doing it for several months, is to print the Table of Contents page number at the bottom of the last page of each issue, facing the inside back cover.

Venezuela's Production Increased 43 Per Cent

Official crude-oil production for Venezuela in 1944 was 257,066,101 bbl., a daily average of approximately 704,300 bbl., it was disclosed last week at Caracas by President Isaias Medina who told Congress that last year's output was an increase of 43 per cent over 1943.

A minimum daily refining capacity of 237,000 bbl. for Venezuela, the president reported, has been assured by 1951 through agreements negotiated with Sinclair Oil Corp., Creole Petroleum Corp., Shell Oil Co., and Mene Grande Oil Co.

Upon conclusion of the present program of new concessions, as provided in the new oil legislation, he said, the government would have given out 5,147,000 hectares for exploration and exploitation and 1,437,000 hectares for exploration of areas already proved, at rates ranging from 60 cents to $677 initial tax a hectare, plus royalties ranging from 16⅔ to 33⅓ per cent with approximately one-half of all concessions paying a higher royalty than the minimum provided by law (a hectare is 2.471 acres).

The president said the government's oil policy seeks to guarantee for future administrations a steady and growing income from oil rather than to take advantage of any opportunity for immediate and sudden access to wealth which would leave the future uncertain.

Referring to the country's economic situation President Medina said he would introduce the largest budget in the country's history, amounting to about $138,500,000, that the treasury has $71,000,000 in cash and revenues for 1944 were about $162,000,000. He said the internal price level rose only 2 per cent last year, credited to tight governmental price control.

Aruba Refinery Runs Raised 32 Per Cent

Pan American Petroleum & Transport Co.'s refinery on Aruba, Netherlands West Indies, processed 32 per cent more crude oil in 1944 than was handled in 1943, according to a current announcement from the Department of Commerce in Washington. The Aruba refinery, the bulletin states, operated at capacity throughout the year.

PAW Relieving Army of Oil Supply Duty in Liberated Areas

WASHINGTON. — Deputy Petroleum Administrator Ralph K. Davies this week moved forward with plans for transferring the allocation of petroleum supplies for liberated areas from military to civilian hands with the assignment of the North African area to the North African Supply and Distribution Committee.

It is understood that the military authorities are anxious to turn this area back to civilian control. The subcommittee of the Foreign Operations Committee will develop a stop-gap organization to channel scarce supplies following the ending of military handling and until normal trade can be resumed.

The FOC will exercise general supervision over subcommittees assigned specific areas. The European Petroleum Committee has already been designated to supervise continental Europe, excluding Russia and Turkey.

Until data can be collected on the needs of various areas, and upon available supplies and transportation facilities, no estimate of the petroleum products which will go to these areas can be made. It is assumed, however, that the supply, most of which will come from the Middle East, can meet only the most urgent demands so long as the war with Japan continues. First need will be for gasolines and oils to operate trucks which, the Combined Production and Resources Board said this week, must be sent to devastated areas to begin rehabilitating wrecked transportation systems.

Reports coming out of Europe indicate that French refineries are completely out of business, some of them wrecked, others moved several years ago by the Germans to the Caspian area and later captured and put into use by Russia. Other sections of Europe face equally serious problems in the petroleum field.

The task assigned the two FOC committees now appointed was explained this week in letters from Davies to Orville Harden, chairman of FOC. First job will be to survey requirements for the assigned areas, and submit reports and allocation schedules. Adequate and detailed supply and import allocation schedules for each area are to be submitted to the director of the Foreign Supply and Distribution Division of PAW.

When actual operations begin, the committee will coordinate shipments on the basis of tanker tonnage allotted to North African and European supply, with the committees assigning tonnage in accordance with the supply programs for each area. The committees will not handle commercial arrangements for shipments. Exporters will make their own arrangements, reporting shipments to the committee concerned.

Monthly estimates of bulk tanker shipping slates for each country will be furnished by the committees, these estimates to cover the ensuing 3 months.

In collaboration with similar committees in London, the FOC committees will report monthly to PAW on quantities of the various petroleum products shipped to each country and the names of consignors and consignees together with names, ports, and sailing dates of vessels involved.

Like the European Petroleum Committee, the North African organization will be expanded and go on active status. Present members of the North African group include: N. Goddard, L. K. Blood, J. Parkinson, W. H. Dunning and H. A. Thomas, of New York; B. P. Newton, Pittsburgh, and J. F. Wooler, Philadelphia.

E. C. Hannum Appointed to Newly Created PAW Post

WASHINGTON.—Erwin C. Hannum, formerly of Bureau of the Budget, has been appointed executive assistant to the chairman of the foreign operating committee, Petroleum Administration for War. In this office, a newly created one, Hannum will work on problems that affect all three of PAW's foreign divisions and will assist in coordinating activities of these divisions with other PAW operations and with work of other government agencies interested in foreign petroleum matters. His work will embrace also the duties of executive secretary of the foreign operating committee, PAW, from which Howard L. Freeman recently resigned to join Oil Well Supply Co. in New York.

E. C. HANNUM

Hannum, who lives in Arlington, Va., joined Bureau of the Budget in 1941 and is familiar with PAW and the related government agencies concerned with petroleum activities.

Graduated from Syracuse University in civil engineering in 1932 and in public administration in 1935, Hannum conducted public works surveys for various organizations including the New York State Conference of Mayors.

Elk Hills Production Near Maximum Limit

SAN FRANCISCO. — Production at the Elk Hills Naval Reserve is now virtually at the maximum authorized by Congress, it was announced here last week by H. D. Collier, president of Standard Oil Co. of California.

He said the development was more than 2½ months ahead of schedule. Actually, he explained, the maximum allowable output of 65,000 bbl. a day had been reached for a short period, but the average now is back to approximately 63,000 bbl. daily because of repressuring work and operating conditions.

Some additional drilling will continue in order to insure an even flow of crude without forcing individual wells beyond their most efficient production and to prevent any possible injury to the reservoir as a whole. Operators have completed 236 wells in the past 10 months.

In announcing the addition of these supplies to the Navy's fuel resources, Collier declared the achievement was made possible only by the coordinated team work of the Navy and the company staffs and the efficient efforts of contractors operating 19 drilling strings which participated in the race against time.

Bids Received for Dry-Ice Land in New Mexico

WASHINGTON.—The public had its first opportunity to acquire government land for production of dry ice when sealed bids were opened April 30 for leases on 23 parcels aggregating 3,242 acres in the Bueyeros carbon-dioxide area near Carlsbad, N. M. Lease of the land was ordered by the secretary of the interior after experts had reported that the Government's share in the carbon-dioxide gas was threatened with depletion through drainage. The lessee must pay an annual rental of 25 cents per acre and royalties based upon the rate of production. If valuable oil deposits are discovered the annual rental rate will be $1 per acre.

Research and Development Emphasized by Standard

Approximately $9,000,000 and almost 3,000,000 man-hours were spent on research and development during 1944 by Standard Oil Co. (New Jersey), Eugene Holman, president, says in his annual report to shareholders. This included work which will substantially increase 100-octane gasoline production; research on jet propulsion fuels, which the companies are now supplying to the military for development work; and the solution of processing difficulties that had delayed large-scale production of butyl rubber. Butyl is a synthetic developed by Jersey Standard, with extraordinary air-retention properties in the manufacture of inner tubes.

To meet wartime needs Standard and its affiliates raised crude production 33 per cent over the previous year and pushed refinery runs above 1,000,000 bbl. daily for the first time in the company's history. Despite a record drain on its crude-oil reserves, the company's domestic reserve position was slightly bettered by intensive exploration. Crude-oil production of affiliated companies amounted to 923,000 bbl. per day, of which 430,000 bbl. was from domestic sources.

The report states that Jersey Standard affiliates manufactured one-half of all the synthetic toluene used by the United Nations in making TNT, and 14.5 per cent of all the butadiene for synthetic rubber produced in the United States and Canada.

Little information has been received concerning condition of oil fields, refineries and marketing properties seized by enemy countries, Holman said, and in liberated areas of Europe properties remain under military control.

More than 1,000 veterans have returned to the organization from military service and an additional 632 veterans not previously with it have been employed. Families of employes in uniform have been paid over $6,000,000 under the companies' plan for helping employes on military leave.

Gasoline Stocks Increased Despite Traffic Difficulties

WASHINGTON.—Notwithstanding severe transportation difficulties, a temporary buildup of civilian gasoline stocks has been effected along the East Coast to meet the usually high seasonal demand. Inventories of this grade of motor fuel in the Atlantic seaboard area (District 1, Petroleum Administration for War) on April 21 totaled 8,677,000 bbl., approximately 680,000 bbl. more than were in stock the corresponding date in 1944. This additional stock represents less than ½ of 1 per cent of consumption during the last year. Stocks were 313,000 bbl. more than were on hand April 14, 1945.

Ralph K. Davies, deputy petroleum administrator, emphasized this increase had been planned by PAW to assure adequate supplies for the peak gasoline consumption period in face of a transportation problem likely to become increasingly serious. Tankers that had been available for shipment of civilian petroleum products into East Coast ports have been released for military service, and there is a growing drain on rail transportation to supply military and essential civilian demand on the West Coast and in other parts of the country.

While movements of gasoline have been comparatively heavy in recent weeks it is expected they will have to be reduced, at least for a time, to release transportation facilities for building up home-heating oil and other stocks.

Tank-car movement of crude oil and petroleum products into District 1 dropped slightly last week for the third successive week, averaging 538,667 bbl. a day compared with 539,443 the previous week and 546,000 during the week ending March 17 when a 6 months' record high was established.

Shipments of kerosene in drums to the New England states averaged 16,146 bbl. daily last week as against 16,349 the previous week. Barge movements up the Mississippi and Ohio rivers, while still hampered by flood crests, continued to show a slight improvement.

Army, Navy, Manufacturers Stage Fire-Fighting Tests

CLEVELAND.—The Army, Navy and leading manufacturers of fire-fighting equipment cooperated in a 6-day series of tests conducted here this week, planned by engineers of The Standard Oil Co. (Ohio), with burning oil in a steel tank shell 93 ft. in diameter. The tests were designed to demonstrate the results obtainable by the use of mechanical foam in several ways and water fog under various pressures, according to R. T. Henderson, Sohio safety engineer, who was in charge of the tests.

"With all the progress that has been made in developing more effective means of fighting fires involving oil or other highly volatile materials, there is still much to be learned about how to use the most advanced methods under various conditions," G. W. Hanneken, Sohio vice president in charge of manufacturing, explained.

Pools Included in Subsidy Program Announced

WASHINGTON. — The Office of Price Administration announced this week its list of pools included in the subsidy program effective May 1. Additions may be reported later. The list includes:

Kansas—McLouth North, Jefferson, at 35 cents per barrel; McLouth East, Leavenworth, 25 cents; Beisel, Russell, 7 cents (high cost).

Louisiana — Gillis, Calcasieu, 35 cents (high cost); English Bayou, Calcasieu, 25 cents (high cost).

Oklahoma—Bebee (Hutton lime), Pontotoc, 35 cents; Wewoka townsite (Hutton lime) Seminole, 20 cents; Newby, Creek, 35 cents; Jesse (Thurman), Pontotoc, 25 cents; Twin Mounds, Payne, 25 cents; Davenport South, Lincoln, 35 cents.

Texas—Moore, Howard, 35 cents; Welch, Dawson, 24 cents (high cost); Sayles, Jones, 20 cents.

The list of pools to be included under the plan as of April 1 placed the Patton pool, Wabash County, in Indiana instead of Illinois, OPA announced. The price per barrel for this pool is 35 cents.

DEATHS

J. Bruce Northrup, 61, superintendent of the Quaker State Oil Refining Corp.'s refinery at St. Mary's, West Virginia, died April 23 at St. Mary's. He had been affiliated with the company for the past 27 years.

George W. Dana, 39, producer in the Bradford oil fields, died in Bradford, Pa., recently.

Frank Orr, 63, tax attorney for the Sinclair Prairie Oil Co., died in Tulsa last week after a brief illness. He had been with the company for 25 years.

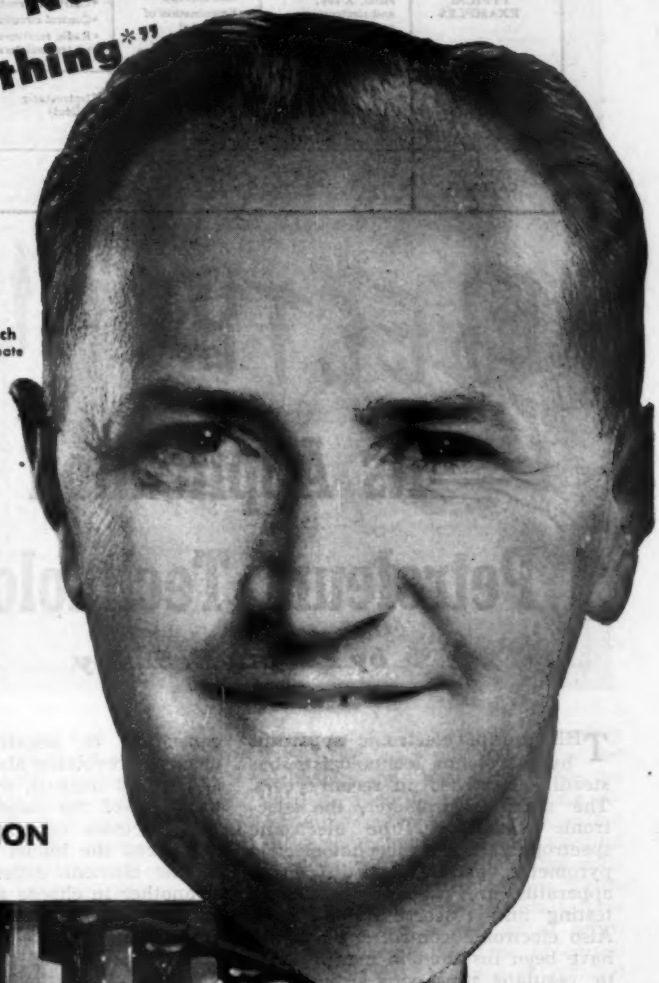
Henry A. J. ten Brink, division material foreman for the Humble Oil & Refining Co., died April 22 in Wichita Falls, Tex.

C. W. Shartle, 53, vice president and sales manager of the Texas Electric Steel Casting Co., Inc., died April 25 in Houston, Tex.

Harold Beach Goodrich, 75, internationally known petroleum geologist in Tulsa, died April 25. His death ends a career of more than 50 years in geology, which started with the United States Geological Survey in the Yukon River gold field in Alaska.

Harry Lewis Eckhart, 63, retired oil man, died recently in Dallas. He came to Dallas 5 years ago from Joplin, Mo.

"But Joe... we never said Nalco was good for everything*"



J. H. Gronbach
National Aluminate Corporation

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* Joe, a superintendent, says this about water treatment: *"I wouldn't waste my time on water treatment that does everything."* Source: Survey conducted by a well-known power publication.

TABLE 1—VACUUM ELECTRONIC TUBES

TUBE NAMES	KENOTRON *(Diode)	X-RAY	PLIOTRON *(May be Triode, Tetrode or Pentode)	CATHODE RAY	MAGNETRON	KLYSTRON RHUMBATRON	VACUUM PHOTOTUBE
APPLICATION	Rectifies low values of current (often at high voltage)	Produces X-ray radiation	Amplification and high frequency oscillation	Produces visual indications by controlled electron beam	Ultra high frequency (U.H.F.) oscillation	Used in military radio and detection devices	Used in applications where audio frequency response is important
TYPICAL EXAMPLES	Rectification in radio, X-ray, and electrostatic precipitation	•Medical diagnosis and therapy •Examination of industrial products	•High frequency heating •Carrier current •Control circuits •Radio receivers and transmitters	•Circuit analysis •Television	Short wave radio		Sound movie
TYPE OF CONTROL	None		Electrostatic (Grid)	Electrostatic or Electromagnetic	Electromagnetic field	Resonance chamber	Light variation
TYPE OF CATHODE	Hot						Photoelectric

ELECTRONICS —Its Application to Petroleum Technology

by Fabian R. Staley

THE use of electronic apparatus by petroleum technologists has steadily increased in recent years. The mass spectrometer, the electronic microscope, the electronic spectrophotometer, the photoelectric pyrometer, and X-ray diffraction apparatus are used in petroleum testing and research laboratories. Also electronic control instruments have been installed in many plants to regulate processing conditions. Many devices developed by the radio industry are finding extensive application aside from communications, and after military restrictions have been eliminated, the phenomenal advances made in high-frequency radio will be available to all industry.

Electronics and chemistry are closely allied sciences because of the electrical nature of matter. Investigations of the molecular structure of organic compounds contributed greatly to the development of the modern theory of atomic structure, according to which the atom is a miniature solar system consisting of negatively charged electrons revolving about a positively charged nucleus, which is essentially all of the mass of the atom. The electrons of all elements are alike, but the nuclei of the atoms of one element differ from those of another in charge and mass. The positive nuclear particle is called the proton, and its mass is about 1,800 times that of the electron. It is presumed that the hydrogen atom, because of its lowest atomic weight, contains one electron and one proton. Ions are charged particles resulting from the addition or removal of one or more electrons from a normal atom. The discovery of the electron, and the determination of its magnitude at the close of the last century marked the beginning of a new epoch in the history of science. The scope of chemical research was extended enormously.

Electronics deals with the conduction of electricity through a vacuum by means of electrons, or through a gas by means of electrons and ions. Before the introduction of the vacuum tube, conduction through metals or through liquid electrolytes were the only methods used to conduct electric current. Metals are the best conductors of electricity, because the outer electrons are only loosely attached in their atoms and drift in the spaces between them. When a potential is applied to a conductor the random motion of the free electrons is increased, and an electron drift is started in one direction. This drift is electric current. As the electrons move and collide with the closely packed atoms some of their kinetic energy is converted into heat.

In the case of electrolytes the molecules of the dissolved compound form ions which are electrically charged particles. The positively charged ions travel through the liquid in the direction of the current, while the negatively charged ions travel in the opposite direction.

The conduction of electricity through a gas is quite complex, and the nature of the discharge depends upon the pressure and kind of gas, the size and shape of the electrodes, their distance apart, and the size and shape of the enclosure. At one time gases were believed to be perfect insulators, but it has been found that under suitable conditions a gas becomes a good conductor. Electrons or gaseous ions must be present in order that electricity can flow between the electrodes, since the current is the drift of negative carriers to the positively charged electrode together with the drift of the positive ions in the opposite direction. The atoms and molecules of a gas can be split into ions by impact from high-speed particles, by thermal action, and by wave energy.

In the case of conduction in high-vacuum electrons must be supplied

TABLE 2—GAS-FILLED ELECTRONIC TUBES

TUBE NAMES	RECTIGON • TUNGAR	PHANOTRON (Mercury Vapor Rectifier)	THYRATRON *(May be Gas Triode or Gas Tetrode)	PERMATRON	GLOW TUBE • PROTECTOR TUBES (For special applications)	GRID GLOW TUBE *(Gas Triode)	GAS PHOTOTUBE
APPLICATION	Low voltage rectification	Rectification of moderate amounts of current at voltages up to 20,000	Control and controlled rectification of moderate amounts of current at voltages up to 23,000		Illumination, rectification and regulation at low current, low voltage	Controls small amounts of power	•Process and quality control •Detection devices
TYPICAL EXAMPLES	Battery charging	Radio transmitters and industrial applications	•Welding control •Timing circuits •Motor control •Voltage regulation		•Switchboard indicating lights •Control circuit voltage regulators •Protection of supervisory control circuits	Safety control of furnaces	•Sound movies •Pinhole detector •Cutting, winding and printing control
TYPE OF CONTROL	None		Electrostatic (Grid)	Electromagnetic	None	Electrostatic (Grid)	Light variation
TYPE OF CATHODE	Hot				Cold		Photoelectric

TUBE NAMES	POOL TUBE (Mercury Arc Rectifier)	GRID POOL TUBE • EXCITRON (Mercury Arc Rectifiers)	IGNITRON	GUSETRON
APPLICATION	Rectification, conversion and control of large amounts of power			
TYPICAL EXAMPLES	Power for Aluminum, Magnesium, Mining, Electrochemistry, Transportation and Steel. (Ignitrons and Gusetrons are also used in resistance welding control.)			
TYPE OF CONTROL	None	Electrostatic (Grid)	Resistance ignition	High potential gradient ignition
TYPE OF CATHODE	Pool (usually mercury)			

"It is quite probable that the advancement of science during the next quarter century will relate more definitely to electronics than to any other subject. Each step in progress may be expected to suggest practical applications of electronic theory which will give man increasing control of the forces of nature."

Ralph Gorton Hudson, May 1932

at the cathode. There are three important means of emission: (1) Thermionic, by temperature elevation, which is the most important. (2) Secondary, by bombardment with rapidly moving ions, electrons, or metastable atoms. (3) Photoelectric, electromagnetic radiation of sufficiently short wave length falling upon body.

As the electrons travel toward the anode their velocity continually increases, and its value at the anode will depend upon the potential difference between the electrodes. As they strike the anode their kinetic energy is largely converted to heat.

Electronic Tubes

The electronic tube is a simple electrical device that controls current without the use of moving parts, and this control is infinitely more rapid than is possible by any mechanical means. The tube is in essence a switch or valve that can be used to rectify, generate, amplify, control, convert light into electricity, and to convert electricity into light. It is rugged and sure in application. By means of a vacuum or a gas-filled tube emitted electrons can be controlled regardless of source. The flow of electrons from the cathode to the anode can be controlled by variation of the anode potential, by variation of the force causing cathode emission, or by the introduction of a third element or grid. The electrons must pass through the grid, and if it is made positive a greater number of electrons are pulled from the cathode. When the grid is made negative the flow of electrons is reduced or cut off entirely. In this way a small change of potential on the grid can control a large flow of current through the work circuit. Many electronic devices owe their value to this fact. During the early study of electricity it was believed that electric current flows from a positive to a negative potential, but with the discovery of the electron, which is a negative charge, it is clear that current flows toward the positive potential.

The electronic tube is inherently a rectifier, or a one-way valve for electricity, and therefore it can be used as a method of rectifying alternating current. The tube, called the Kenotron, is the usual vacuum rectifying tube used for high-voltage, low-current applications. These tubes are used for electrostatic precipitation, and a number of refineries are using this type of equipment for the recovery of catalyst dust in high-octane-gasoline manufacture.

When a two-element tube is connected to a source of alternating current, every time the alternator produces a positive half wave of voltage the anode attracts electrons and current flows, and every time the alternator produces a negative half wave of voltage the anode repels electrons, and no current flows. This method of obtaining pulsating direct current is known as half-wave rectification. One way to obtain full-wave rectification is by means of another tube; then a smoother direct current is produced.

TABLE 3—RADIO TERMINOLOGY

DIODE—Two elements (anode and cathode)
DUO-DIODE—Two diodes in one envelope
TRIODE—Three elements (anode, cathode and grid)
DUO-DIODE-TRIODE—Two diodes and a triode in one envelope
TETRODE—Four elements (anode, cathode and two grids)
PENTODE—Five elements (anode, cathode and three grids)

Radio tube names usually indicate the number of tube elements. Many tubes having more than five elements are in use.

(In radio terminology, the anode is usually called the plate.)

A still smoother current is produced with a filter system.

The application of the Kenotron is limited by a factor known as negative space charge, which is due to the fact that electrons repel each other, and that their concentration is greatest near the cathode. This opposition can be overcome only at the expense of a large voltage drop. An advantage of this tube, for high-voltage application, is its characteristically high resistance to arc-back during negative alterations of the applied voltage. This resistance is higher than that characteristic of the gas-filled tube.

Gas-filled tubes minimize or completely cancel the current opposing effect of negative space charge because of the ionization of the gas in the tube, since some of the negative space charge is reduced by the positive gas ions moving toward the cathode. When this barrier to electron flow is down an enormous increase in the flow of emitted electrons or current results. The advantages of the gas-filled tube is increased current capacity and low power loss. The gas-filled diode uses an inert gas, as argon, or mercury vapor, in amounts to just neutralize negative space charge around the cathode. The tube, known as the Rectigon, is usually filled with argon. Its cathode is a directly heated tungsten filament, and its anode is a graphite disk. For full-wave rectification two of these tubes are used, and one of their principal applications is the charging of storage batteries from alternating current power lines.

The Phanotron is a hot cathode tube filled with mercury vapor, which can stand a considerably higher input potential without arc-back than can a gas-filled tube. It is suitable for many medium power applications, and is used to supply high-frequency heating lines. The Phanotron rectifier is suitable as a power source for magnetic fields of rotating machines, magnetic chucks, and magnetic separators.

The electronic method of converting alternating current to direct current is now extensively used in electrochemical processes. Mercury-arc rectifiers are used for this purpose. Tubes with a mercury-pool cathode depending for vaporization upon timed ignition are called Ignitrons. The mercury pool emits electrons by means of the ignitor, which functions by means of an auxiliary firing circuit. It is a half-wave rectifier, but full-wave rectification can be accomplished by the use of a two-unit circuit. The outstanding advantages of this tube are high short-time overload capacity (a heavy overload merely vaporizes more mercury, which condenses and returns to the cathode pool), and flexibility of control. The latter adapts it to applications requiring split-second timing.

Resistance-Welding Control

Electronic resistance-welding control has greatly increased the speed of forming liquid-tight and gas-tight joints, and no single kind of industrial electronic equipment has contributed more to the nation's war production. The Ignitron contactor is a high-capacity device, using electronic tubes to close and open the primary circuit of a resistance welder. It consists of two water-cooled Ignitron tubes, which act as a power switch conducting alternating current to the welding machine when the control circuit is closed. Ignitron tubes can also be used in such a manner that the magnitude of the welding current can be adjusted smoothly over a wide range by means of a small potentiometer. This method of current or heat adjustment is known as the phase-shift method, and can be applied to Ignitron contactors or other types of electronic resistance-welding controls.

A Thyratron is a three-electrode hot-cathode tube containing gas or vapor, and is one of the most useful control devices ever invented. Its applications are numerous. When used in alternating current circuits it can be made to give continuous control so flexible that the strength of current to the load can be varied in an infinitely wide series of stepless graduations. The same phase-shift control methods that operate through a Thyratron grid also work through an Ignitron ignitor. In this

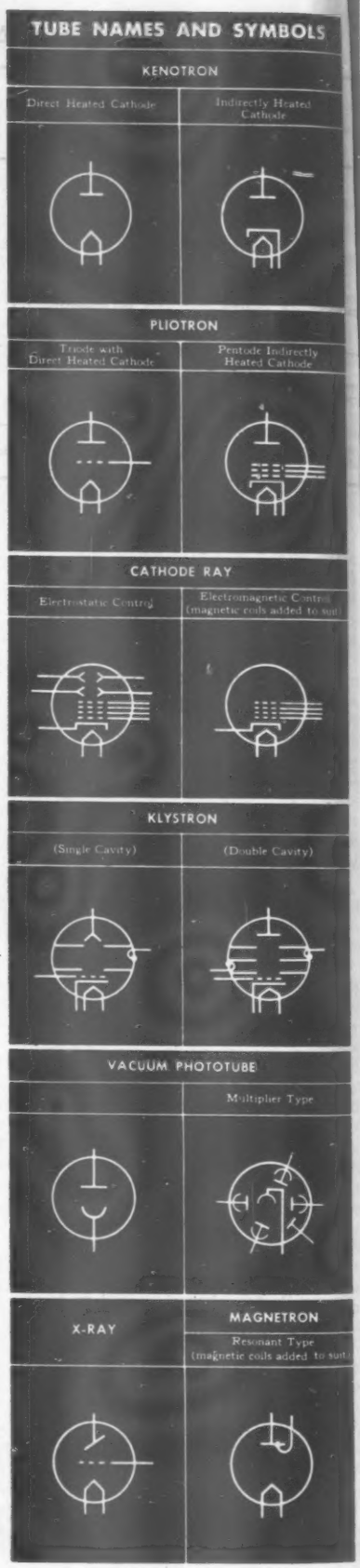
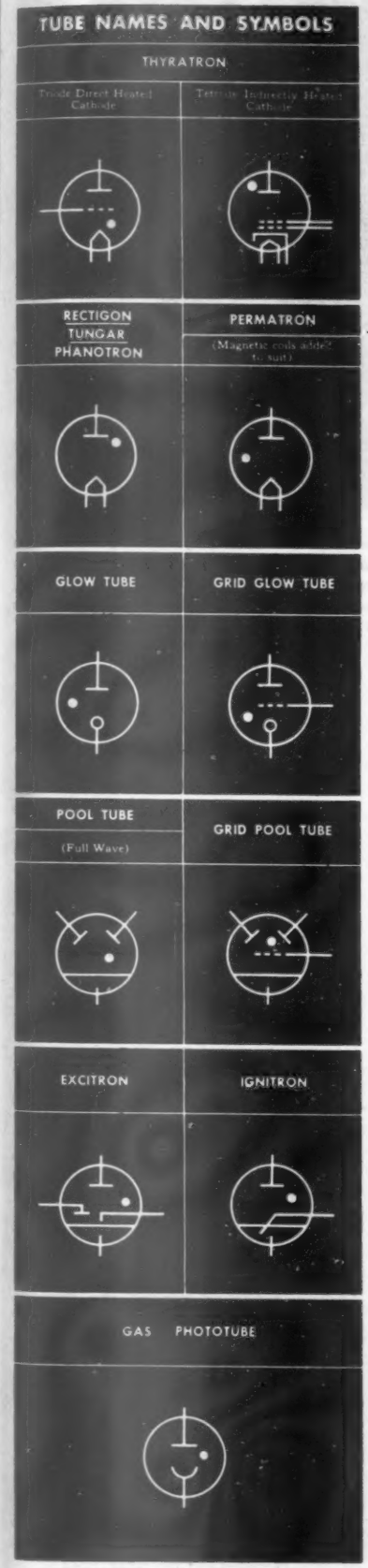


Table 4—Typical symbols for high-vacuum electronic tubes



way great bursts of current can be controlled with split-second timing and with a minimum of energy.

Thyratron synchronous precision controls for resistance welding consist of an adjustable synchronous timer, an electronic switch (Ignitron contactor), and in some cases, an electronic heat control for fineness of current adjustment. They control the time interval and current magnitude for each weld.

Electronic Heating

The electronic tube can generate alternating currents from a direct-current line. At high frequencies the currents produced have a constancy of frequency and a purity of wave form not obtainable by any other means. Another characteristic of these alternating currents is enormous frequency range. Vacuum tube oscillators can produce frequencies of a few cycles per second to several hundred million cycles per second, far beyond the range of rotating equipment. They can also produce power outputs ranging up to hundreds of kilowatts. Oscillators are classified according to circuit type and according to frequency range. Many different circuits are employed to cause oscillation by feed-back in which a part of the alternating-current voltage is induced in a feed-back coil, and when the coil is connected to the grid in the proper phase relation, its induced voltage can replace the alternator's voltage, and the entire circuit then becomes an electronic alternating-current generator. Other types of oscillator circuits don't use the feed-back principle, but rely instead on the mechanism of negative resistance.

For induction heating the charge is placed in or adjacent to a water-cooled induction coil carrying a high-frequency alternating current. The magnetic field thus produced induces a current in the surface of the piece, and causes the piece to heat largely by resistance losses. This heat is generated in a surface layer, the depth depending upon the frequency, and upon the specific resistance and permeability of the material. The heat can be concentrated on the surface of a sharply defined area, and consequently induction heating is invaluable for surface hardening of gears, shafts, and the like. Electronic heaters are excellent for brazing and soldering small parts, and they find many applications in the annealing of small areas of furnace-hardened parts without affecting the required hardness of the adjacent portion.

In dielectric-heating the temperature of the body is raised uniformly throughout the mass, without overheating the surface. Heat conduction is eliminated as a factor, and heating time is reduced from hours to minutes.

Table 5—Typical symbols for gas-filled electronic tubes

Electronic Amplification

Pliotrons are used for amplification. There are a number of types, but they are all high-vacuum tubes that contain at least three elements, cathode, anode, and grid. The grid is usually located close to the cathode in order to influence the space charge at that critical point. Small changes of potential applied at the grid magnify into large current and voltage variations in the anode circuit. The anode circuit is supplied with its own source of power, usually direct current, but may be alternating current for certain applications. The grid circuit is usually supplied with a source of voltage called a grid bias, on which the signal to be amplified is superimposed. When the signal is even slightly positive great help is given the anode in pulling electrons across the tube, and when the signal is even slightly negative an equally enlarged effect is produced in reducing or interrupting the electronic flow to the anode. Thus it is possible for a slight change of potential on the grid, with nearly zero input, to produce a large change of current and voltage in the anode circuit. Only vacuum tubes can be used for amplification on account of the grid effect described.

Small signal voltages in control circuits can be amplified greatly to operate Thyratron relays, and similar devices. Amplifying tubes are used in the "dynetric" balancing machine to magnify minute voltages produced by rotor unbalance.

Electronic Control

Electronic control finds a very wide range of applications in industry. Sound, light, temperature, time, and speed are variables that can be translated through control circuits into the starting and stopping of current flow, or the increasing and decreasing of current strength. Electronic control circuits are capable of great variation, but they all fall into a few major classifications and share certain basic principles.

Cockrell classifies electronic circuits for industrial control into the following general types:

1. Power conversion — rectifying of alternating current to direct current or inversion of direct current to alternating current at high or low frequency. This also includes frequency conversion, in which an alternating current is rectified and then inverted back to alternating current at a different frequency.

2. Amplification—a small incoming alternating-current signal or direct-

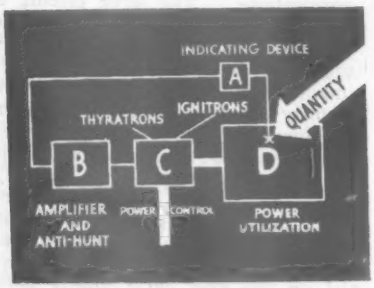
current difference of potential is magnified to an outgoing signal of similar character but of greatly increased power and potential change.

3. Electronic timing circuits.

4. Electronic switching of circuits, which is by far the most accurate and fastest means.

In the electrical industry a distribution is made between "regulation" and "control." Regulation is based on "feed back" but control is not. A regulator tends to keep constant some quantity like voltage, speed, temperature, or position through a system that automatically correct errors by feeding quantity being regulated back into system.

The many applications of electronic regulation are illustrated by means of a simple diagram:



Basic elements of regulator circuits

The quantity to be regulated may be a voltage, or it may be translated into voltage by some indicating device, "A," which might be a thermocouple, a phototube, or a tachometer generator. The produced indication is amplified by element, "B," and made to initiate a back-to-normal effect which is kept from overshooting by an electronic dashpot. Power control is furnished by element, "C," supplementing the low-energy voltage amplifying function of the Pliotrons in "B." The power control can be furnished directly by Thyratrons in low-power amplification, or in high-power amplification by Thyratrons in connection with Ignitrons, saturable reactors, M-G sets or relays. Element, "D," represents the power-utilization device for which regulation is required.

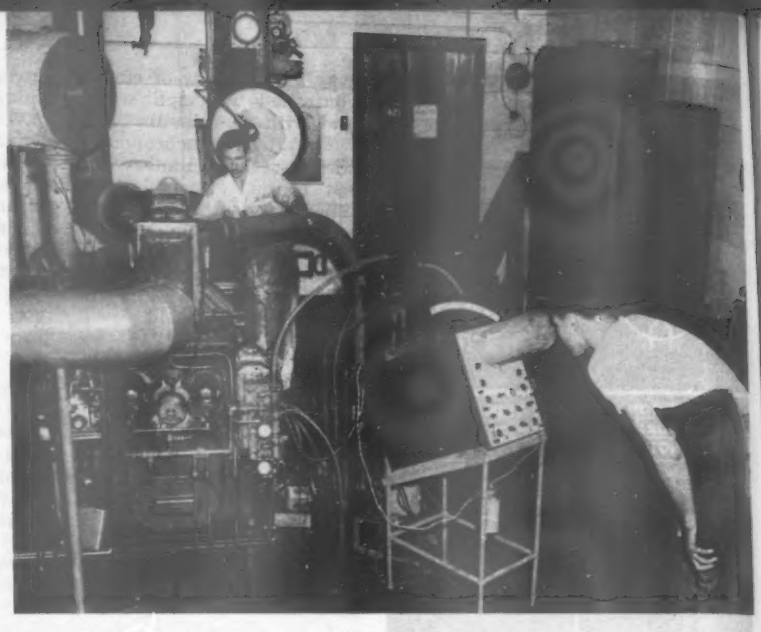
Control always adjusts a quantity, like motor speed, or furnace temperature, through influence outside the quantity itself. These influences may be unlimited in variety.

Electronic controls are in operation in all branches of engine testing. They are used:

1. To hold speed constant automatically.

2. To control the loading on testing equipment during sudden speed changes, as during rapid engine acceleration or deceleration.

Applications in the testing field include chassis dynamometers where road, grade, and wind effects are simulated; and on dynamometers used with fuel development and testing engines where versatile and accurate control is necessary.



The performance of high-octane aviation gasoline and lubricating oils is observed in a full-scale single-cylinder airplane engine in the research and development laboratories of Socony-Vacuum Oil Co., Inc., at Paulsboro, N. J. George Redfield, in rear, is watching the cylinder, and Karl Schmidt, right, observes through the oscillograph the detonation characteristics of the gasoline

Light and Electronics

Electronic tubes are used to convert light into electricity and back into light again. There is a reversible energy relationship in the interaction of electrons and light. Light energy may eject an electron from the light-sensitive surface of a cathode, converting light into electricity, and that same ejected electron may collide with a molecule of gas causing it to give off radiant energy or light. When light impinges on a substance, units of radiant energy known as photons disturb the electrons within the substance. If the electrons are disturbed without emission the change is called a photovoltaic effect; if electrical resistance is changed the effect is called photoconductivity, but if electrons are ejected from the substance the effect is called photoemission.

The typical vacuum phototube consists of a cathode coated with a photosensitive substance and an anode of distinctive shape. Light falling on the cathode, when the two electrodes are connected in series with a battery, causes the emission of electrons in accordance with two basic laws: (1) The velocity of the electron emitted is proportional to the frequency of the light wave, (2) the quantity of electrons emitted is proportional to light intensity. Since the phototube has both color sensitivity and brightness sensitivity its control range is very large. A gaseous phototube has greater sensitivity to light, but it is more susceptible to damage from overload, maintains its sensitivity a shorter time, and has poorer dynamic response than vacuum type.

When collision takes place between electrons and atoms the phenomenon is accompanied by the production of light. The color depends upon the kind of gas in the tube. Among the light frequencies produced by mercury vapor is ultraviolet, which has the ability to cause certain materials to fluoresce. This principle is utilized in the manufacture of fluorescent lamps. The inner surface of a glass tube is coated with a fluorescent material containing a small quantity of mercury. Heated electrodes at the ends of the tube produce initial electrons for ionizing the mercury vapor. Ionization, in turn produces the ultraviolet light which causes the coated surface of the tube to fluoresce.

The X-ray tube, indirectly, transforms electric current into light and into light images. A high potential of 300,000 volts, or more, is applied between the anode and the cathode of a two-element tube. A cylinder (focusing cap) surrounds the cathode in the tube, and directs the electron emission toward the anode, generally called the "target." The electron stream hits the target with such tremendous impact that ultrashort wave radiations result. These are known as X-rays, and have the important property of being able to penetrate solid objects. The degree of their penetration for a given

(Continued on page 116)

Catalytic Cracking of Texas Panhandle Gas Oil by Cycloversion Process

by A. E. Buell and Bradley Skinner

PHILLIPS Petroleum Co.'s commercial "cat cracker" has been in operation since June 1944, and is presently charging 10,000 to 12,000 bbl. per day of gas oil to produce valuable raw materials for the manufacture of aviation-gasoline components and high-grade automotive fuel stocks. This period has proved the advantages of the Cycloversion process, and has permitted the accumulation of data applicable to operations for premium-quality motor-fuel manufacture.

Improvement of Products by Cycloversion

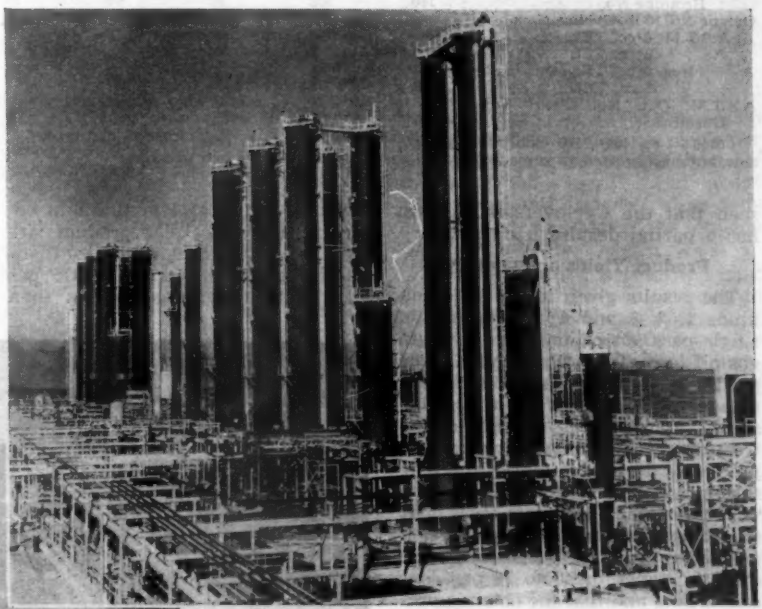
Cycloversion of Texas Panhandle gas oil is producing gasoline of greatly improved quality over thermal cracking of the same stock. For example, thermal cracking of this stock produces gasoline having a clear A.S.T.M. octane number of 57 to 61 with a corresponding Research octane number of 70. In contrast, Cycloversion operations on the same gas oil produces motor fuels with clear A.S.T.M. octane numbers of 76 to 77 (Research O.N. 86). Thus an increase of 16 to 19 clear A.S.T.M. octane numbers is produced by Cycloversion, a clear rating well above the 3 cc. TEL rating of thermal gasoline made from the same gas oil. Accordingly, Cycloversion provides a process for producing premium-quality gasolines.

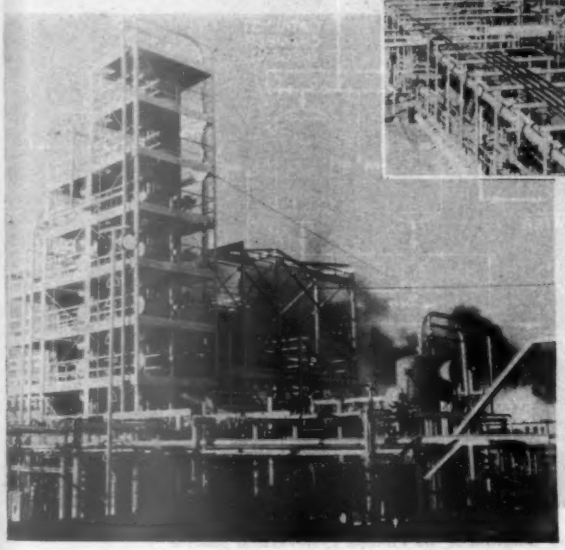
BUELL

SKINNER

A. E. Buell, who has been associated with Phillips Petroleum Co. since 1928, at present acts as manager of the company's Perco division, through which Phillips processes are licensed to the industry. He also acts as manager of the company's special products division, which handles the distribution and technical service on specially prepared hydrocarbons and other chemical products. Buell graduated from Colorado School of Mines with the degree of petroleum engineer in 1926. His first position with Phillips was as research engineer in the development of several refining processes.

Bradley Skinner is at present doing process designing in the process engineering division of the chemical products department of Phillips. During the war he has worked on numerous projects, especially those involving the production of 100-octane gasoline and the applications of catalytic cracking. He has been with Phillips since graduation from Colorado University in 1936 as a bachelor of science in chemical engineering.





Above: What can be done by superfractionation has been demonstrated in plants such as this Phillips system. This is a view of the butadiene plant. Left: Cycloversion is one of the newer catalytic cracking processes for the refiner to consider. Here is a portion of the cycloversion unit

It is noteworthy that the rugged natural catalyst being used in the Cycloversion process has a pronounced desulfurizing action and in no way is adversely affected by sulfur or sulfur compounds. For example, on a virgin gas-oil charge containing 0.36 to 0.45 weight per cent sulfur the Cycloversion gasoline showed .05 to .08 weight per cent sulfur. This compares with 0.14 weight per cent sulfur in the thermal gasoline made from the same gas-oil stock. The Cycloversion recycle gas oil showed a 50-60 per cent sulfur content reduction. Thus it is

TABLE 1—TYPICAL CYCLOVERSION OPERATIONS, PRODUCT YIELDS AND INSPECTIONS FROM TEXAS PANHANDLE GAS OIL

Column:	1	2	3	4	5
Gas Oil Charge	Virgin	Virgin	Virgin	Virgin	Cat. Recycle
Conversion, Single Pass* Vol. %	41.1	50.9	61.1	72.6	33.2
	Comm.	Comm.	Semi-Comm.	Semi-Comm.	Pilot Plt.
Temperature, °F.	990	990	990	1,010	1,000
Pressure, psig.	84	77	90	80	85
Process period, hours	10	10	8	4	4
Yields, Per Cent of Charge:					
Cycloversion gasoline (10 lb. Rvp., 400° e.p.) LV per cent	32.7	38.6	48.0	53.0	23.0
Polymer gasoline† LV per cent	4.3	6.5	7.0	9.3	4.5
Total gasoline, LV per cent	37.0	45.1	55.0	62.3	27.5
Butane from ext. source included in 10-lb. gaso. LV%‡	2.4	1.4	0.7	0.6	0
No. 3 fuel oil, LV per cent	53.0	44.1	35.0	24.6	56.8
Heavy cycle gas oil, LV%	5.9	5.0	3.9	2.8	10.0
Dry gas, C_{4-}, wt. %	8.3	9.5	9.1	13.1	6.4
Carbon, wt. %	1.0	1.49	2.34	3.8	1.9
Feed Stock:					
Gravity, °A.P.I.	35.6	36.1	36.6	36.6	34.7
A.S.T.M. Distillation					
IBP	296	281	275	275	489
10	532	527	510	510	520
50	617	629	606	606	560
90	760	740	717	717	634
Cycloversion Gasoline					
Gravity, °A.P.I.	59.7	59.4	59.6	59.7	59.8
Reid vapor pressure	10.0	9.8	10.0	10.0	10.0
A.S.T.M. Distillation					
IBP	91	93	92	91	95
10	128	131	130	127	131
30	196	191		190	
50	240	253	253	240	247
70	318	315		295	
90	381	377	364	356	362
EP	406	403	399	392	411
Bromine No.	110	103	97	90	85
Octane No. 10 lb. Cyclov. Gasoline:					
A.S.T.M. 0 cc. TEL	76.5	76.3	76.1	76.3	79.2
3 cc. TEL	81.5	81.1	...	...	...
Res. 0 cc. TEL	86.1	85.6	...	...	...
3 cc. TEL	92.7	92.7	...	...	...
A.S.T.M. Oct. No. Clear, Total Gasoline	77.5	77.5	77.1	77.8	80.0

*100 — (% 400° IBP catalytic gas oil). †73% of total butylenes and propylene. ‡Outside butane required to replace butylenes utilized in polymerized gasoline.

seen that the Cycloversion catalyst has a partial desulfurizing action.

Product Yields and Quality

The results given in Table 1 (columns 1, 2, 3 and 4) are typical of single-pass operations on a virgin gas oil from Texas Panhandle crude produced in Gray and Hutchinson counties. Column 5 of this table shows typical results for single-pass treatment of a Cycloversion gas oil, produced during catalytic cracking to 48 per cent conversion of the same virgin gas oil. These data show that the octane numbers of Cycloversion gasolines are relatively the same over the range of 40 to 70 per cent conversion, and that the octane number of the gasoline from the recycle gas oil is substantially higher. The high sensitivity of Cycloversion gasoline, or the difference between A.S.T.M. and Research octane numbers, is a valuable characteristic of this olefinic gasoline.

Experience with the commercial operations show excellent agreement with yields and quality of products predicted on the bench-scale and semicommercial pilot plants as shown in Table 1.

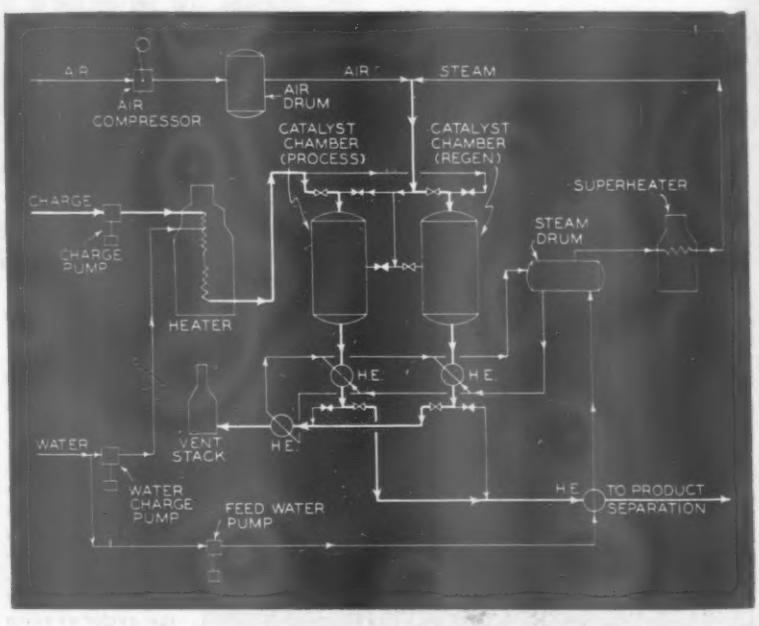
Current Cycloversion practice at Phillips Petroleum Co.'s refinery is to catalytically crack the virgin gas oil by a single-pass operation on cracking cycles of 4 to 10 hours before regeneration. The products are then separated to light olefins, high-quality gasoline, and catalytic gas oil. This catalytic gas oil is then thermally cracked to produce additional gasoline, light olefins, and residual fuel oils.

Very little difference has been noted in the thermal operations when charging the virgin gas oil, now charged to Cycloversion, and when charging the catalytic gas oil. An increase of 10 to 15° F. in transfer line temperatures is giving approximately the same quantity and quality of yields as virgin gas-oil operations. This procedure permits utilizing the existing thermal equipment with the addition of the new "cat cracker."

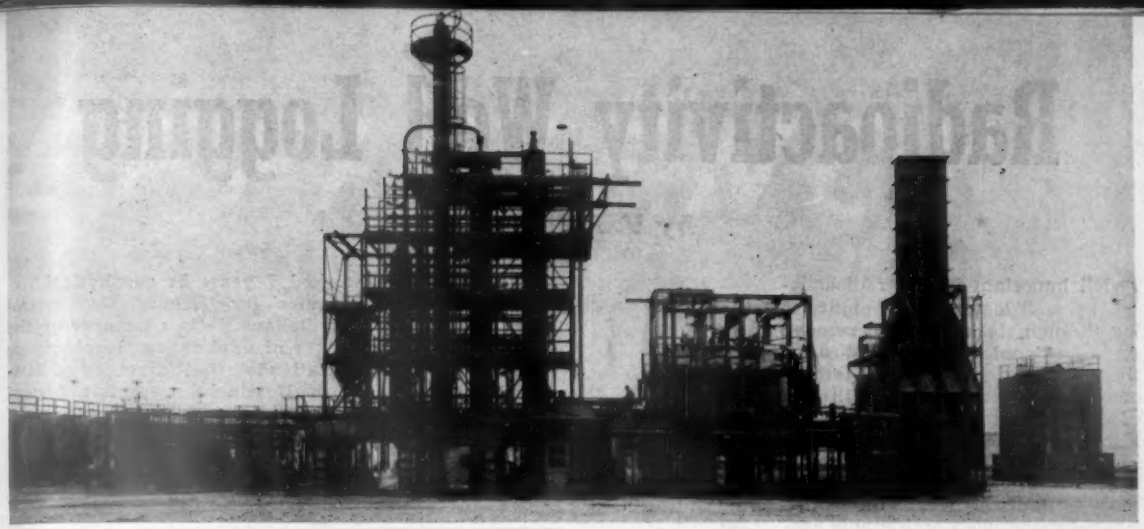
Alternately, two methods could be employed to catalytically crack the catalytic recycle gas oil. One method is to combine the recycle gas oil with the virgin stock and crack the two stocks simultaneously. The other method is to crack the virgin stock for a period of time while storing the recycle stock. The recycle stock may then be catalytically cracked later as a separate operation. While simultaneous cracking of virgin and recycle stock may be a simpler and more continuous operation, the desirability of such an operation or of separate processing of the recycle stock will depend on local storage facilities and individual refinery balances.

Cycloversion Catalyst

To date, it has not been necessary to replace or add Cycloversion catalyst to maintain catalyst activity. Some loss of catalyst has occurred due to handling the catalyst during chamber inspections. This loss amounts to an average of 15 per cent per inspection and has ranged from 10 to 18 per cent.



Flow diagram of the Phillips cycloversion process



Cycloversion unit at a Phillips Petroleum Co. refinery

A liberal assumption of four inspections per year would amount to 60 per cent replacement per year or a catalyst cost of about $0.0016 per barrel of charge. Obviously very little catalyst loss occurs to fines due to abrasion during operation of the fixed-bed chambers of the Cycloversion process. This low cost for catalyst contributes materially to the over-all low operating cost of the Cycloversion process.

Steam diluent is utilized advantageously in the Cycloversion process. During the cracking period the presence of steam materially reduces carbon deposition on the catalyst by effectively aiding the vaporization of the oil. At the end of the process period the steam purges the hydrocarbon vapors from the catalyst chamber to the recovery system. This procedure not only holds hydrocarbon losses to a minimum but also reduces regeneration air requirements. Monthly total losses throughout the complete unit have amounted to only 0.15 to 0.6 weight per cent.

For the regeneration cycle, the use of steam and temperatures of 1,400° F. has reduced average operating air requirements to as low as 115 cu. ft. per lb. of carbon. This is considerably lower than the 150 cu. ft. per lb. theoretical air required to burn carbon to carbon dioxide. The difference between the actual and theoretical steam requirement is due mainly to water gas reactions with steam at high temperatures.

Carbon Deposition

Carbon deposition is an extremely important operating factor in any catalytic cracking process. Daily throughput is more likely to be limited by regeneration equipment than any other part of the unit. Therefore, carbon deposition and regeneration requirements must be carefully considered when planning a specific unit. Factors to be considered are the investment costs and operating costs, as determined by carbon deposition at various conversion levels and gasoline yields. Present carbon depositions are of the order of one to two weight per cent of the gas oil charged. While semicommercial operations have been conducted with carbon depositions of 8 per cent and more, such high depositions will not normally be encountered for motor-fuel production.

TABLE 2—SUMMARY OF OPERATING UTILITIES CYCLOVERSION PROCESS —SINGLE PASS—60 PER CENT CONVERSION

Item:	Unit	Quant./Bbl. Charge
1. Fuel*	MMBtu.	0.583
2. Electricity†	KWH	3.420
3. Cooling water*	M Gal.	0.165
4. Steam (all produced on unit)	M lb.	0.354
5. Steam (outside)	M lb.	0
6. Catalyst	lb.	0.0404

*These values may be lowered by additional exchange where it is justified through high cost fuel. †Includes power for air compression at 115 cu. ft. (STP) per lb. of carbon, or 1,020 cu. ft. per bbl. of charge assuming 3 wt. per cent carbon deposition based on charge.

Since carbon deposition represents such a controlling factor in catalytic cracking, it is believed to be more desirable to follow the lower-cost route of removing heavy carbonaceous material from a feed stock by fractionation before the cracking step instead of burning it out with air. If heavy oils are processed, relatively high carbon depositions may be expected, particularly if vaporization in the preheater is incomplete.

Advantages of Pressure Operation

The relatively high operating pressure of the Cycloversion process (from 75 to 85 psig.) results in many advantages; e.g., reduced size of catalyst chambers and other equipment, lower catalyst requirements, and considerably lower gas-compression costs, which result from three factors: (1) high pressure reduces the gas production as per cent of charge; (2) it increases the absorption effect of the gasoline and catalytic gas oil thereby flashing off less gas; and (3) horsepower requirements are reduced through considerably lower compression ratios when compressing to the pressure required for product separation.

Table 2 is a summary of utility requirements for a Cycloversion unit operating at 60 per cent per pass conversion on a virgin gas oil for a carbon deposition of about 3 per cent, and designed to be self-sufficient with respect to outside steam consumption.

Dry-gas production from the unit, exclusive of propylene, amounts to about 632 MB.t.u. per barrel of charge and the gases are available at 75 psig. at the unit without compression.

Charge-Stock Characteristics

The Cycloversion process can handle a wide variety of charge stocks. Semicommercial operations have been conducted on straight-run and cracked gasolines, naphthas, and gas oils. The commercial unit is currently charging to the catalyst cases a straight-run gas oil with a 36° A.P.I. gravity and a boiling range of about 400° i.b.p. to 750° e.p. This gas oil represents about 18 to 20 per cent of the crude, but data on other crudes indicate from 25 to 30 per cent material boiling in this range. Many refiners now include a portion of such a gas oil in their reduced crude; however, it can usually be segregated by comparatively simple changes on the topping unit. If it is planned to continue operating the thermal units in conjunction with a Cycloversion unit, catalytic gas oil can be added to the reduced crude replacing the virgin material removed for catalytic cracking.

Radioactivity Well Logging

by V. J. Mercier

The author has spent the past 3 years as an electrolog operator, radioactivity engineer and district engineer for Lane-Wells Co. at Wichita, Kans. Previously he worked 7 years in geophysical exploration for National Geophysical Co., Dallas. He is a member of the Society of Exploration Geophysicists and attended the University of Missouri. Herein he presents a few of the applications and advantages of radioactivity well logging from the manner in which it has been employed in Kansas.

ONE important use of radioactivity well logging is its ability to log through the casing and cement. As an example of this application there is pictured, in Fig. 1, the log of a well located in the south part of the Silica area in Barton County, Kansas. At the left portion of the illustration is the geological sample log, as recorded by the geologist at the time the well was being drilled several years ago. Considerable caving was reported and circulation was lost at times. However, the geologist was able to detect oil staining in the samples at 3,047 and 3,087 ft.

The well became depleted in the lower producing stratum, the Arbuckle dolomite, and the operator decided to attempt to secure production from the overlying Lansing-Kansas City limestone section. The aforementioned sample log was the only previous record available. It was thought best to first obtain additional information by taking a radioactivity log, before proceeding to gun perforate. The resulting log is pictured in Fig. 1.

It will be noted that a very good porous zone was indicated at 3,076 to 3,085 ft. by the neutron curve, the correlation from this zone to the oil stain on the sample log being indicated by a dashed line, "A." The zone was gun-perforated with 38 holes and the well came in at 4 bbl. of oil an hour, natural. After acidizing, the well was put on the pump and made 243 bbl. of oil per day plus 4 bbl. of water.

Not only can the radioactivity method log through casing and cement, but it is not affected by the electrical conductivity of the fluid in the hole, whether salt-water mud, oil-base mud, or other fluid.

Use of Correlation

In referring to new drilling, in the Adell pool, Sheridan County, Kansas, one company has conducted a large development campaign during the past year. This pool, located in the northwestern part of the state, is enlarging as a prolific Lansing-Kansas City limestone field. In Fig. 2 are shown the radioactivity logs of six wells in the pool. Two correlations are illustrated by the dashed lines, the upper showing the top of the Lansing, and the lower demonstrating the correlation of one of the producing zones. The production figures given at the top of the logs must not be misconstrued as

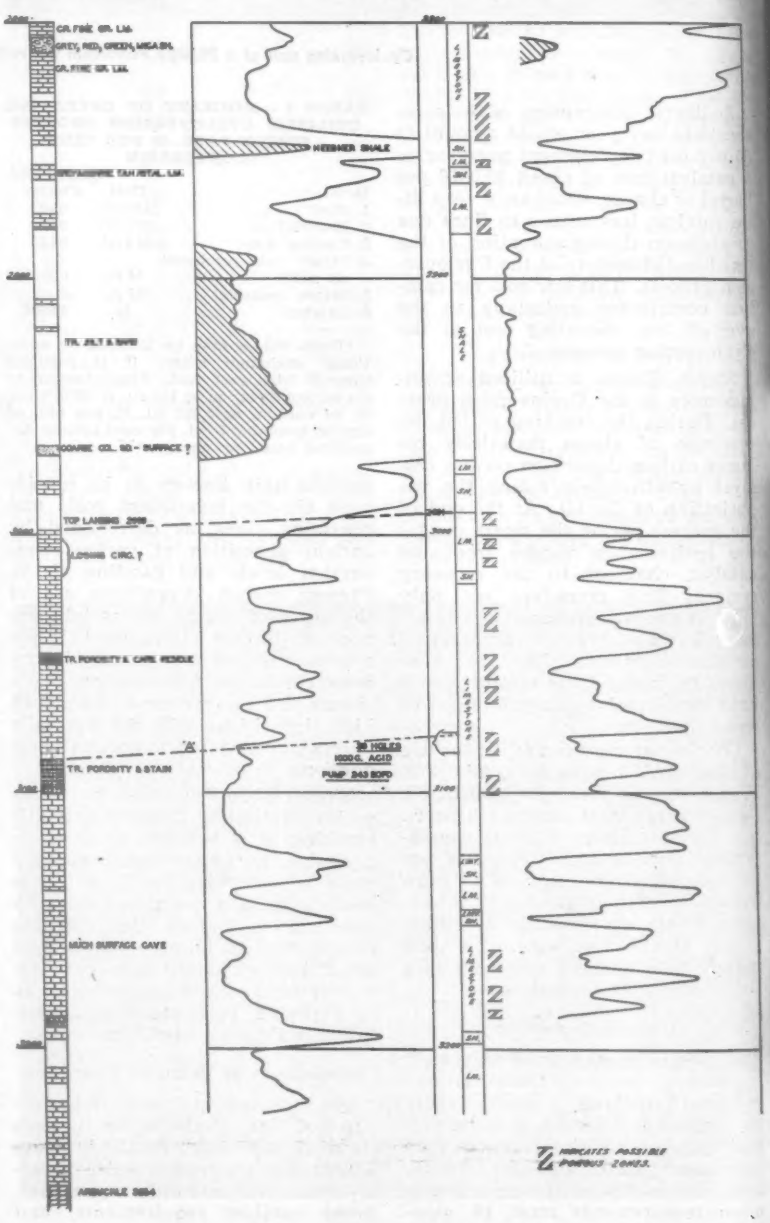


Fig. 1—Log of well located in south part of Silica area in Barton County, Kansas

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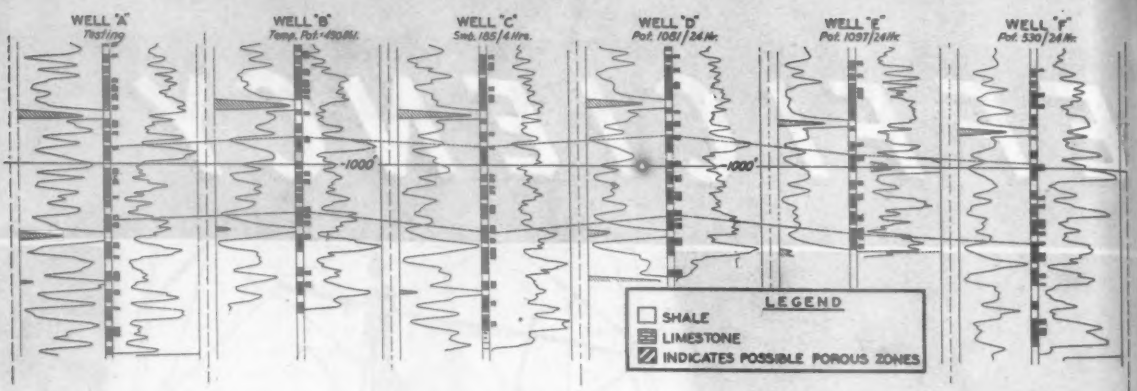


Fig. 2—Radioactivity logs of six wells in the Adell pool, Sheridan County, Kansas, drilled by Continental Oil Co.

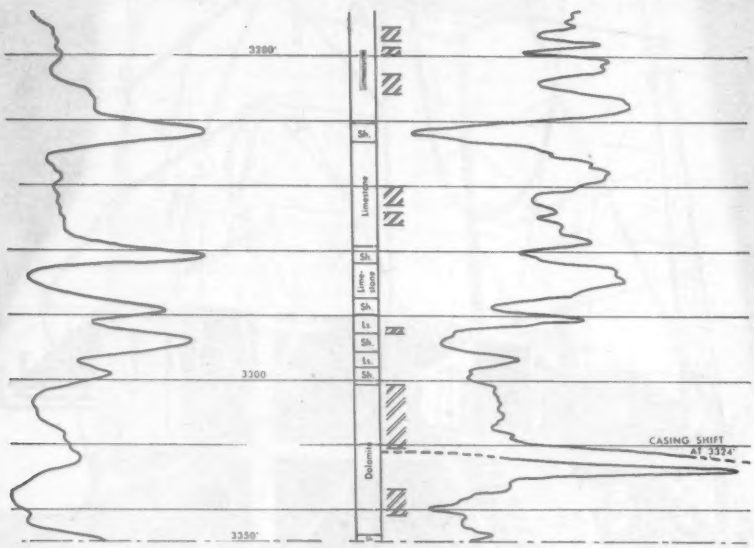


Fig. 3—Top of Arbuckle miscalculated and casing set too low

being entirely from the zone correlated, as there are several oil-bearing zones through the section. The purpose of the illustration is not to picture where the oil is found but rather to show the over-all radioactivity logging picture. Fig. 2 is set up with all of the logs adjusted to correct for elevation differences, as can be seen by the position of the minus 1,000-ft. datum through the approximate center of the drawing.

Another feature of the radioactivity log is the ease and accuracy of correlation. This is significant to the petroleum geologist and engineer, whether in exploring for new petroleum sources, extending present fields, or estimating reserves of already proven areas. Fig. 2 shows the general similarity between the various logs. One point in this case is the second-beam curve representing the black Heebner shale. Many shales, such as the Heebner in Kansas, are of the maximum sensitivity encountered and are usually shown as a second-beam curve on the gamma-ray log. Study and inspection of the illustration will reveal the individual changes in formation and porous zones occurring from well to well.

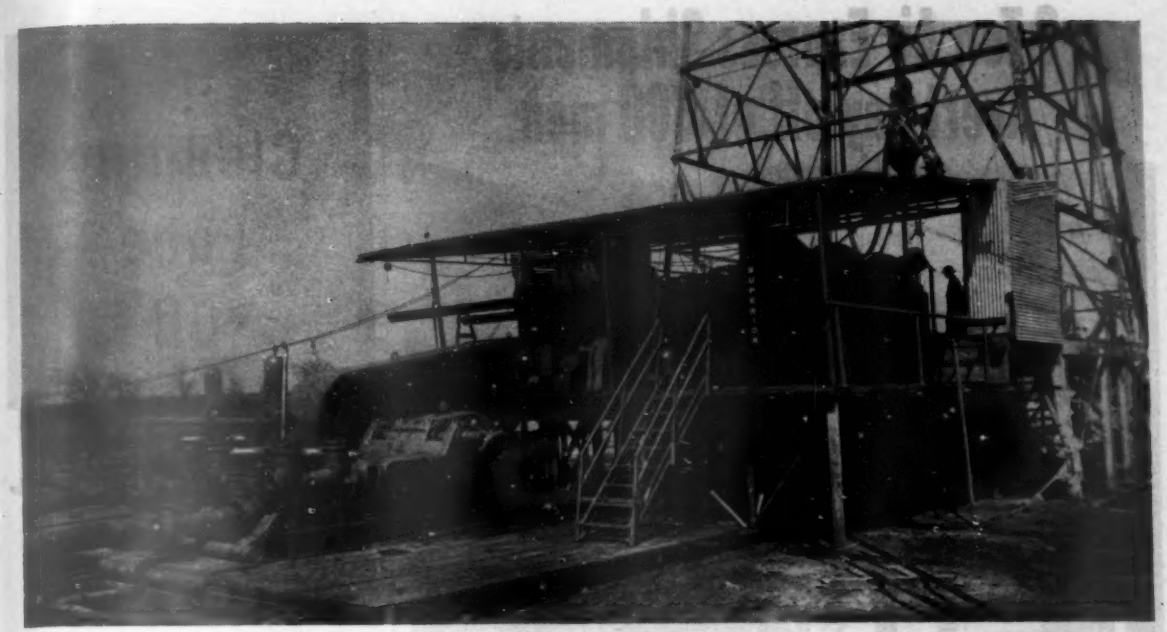
Locating Casing Shoe

One feature of the neutron curve is becoming increasingly important in Kansas and other areas. When the neutron instrument was being developed a change of sensitivity occurred upon entering or leaving fluid or casing. This change of sensitivity causes what is termed a "shift" on the recorder. Originally this action was considered to be of "nuisance" value only, and was so treated. When the neutron instrument, proceeding from the open hole, enters the cased hole, the pipe enveloping the neutron source acts as a partial shield and therefore suddenly lowers the sensitivity. This in turn causes the pen on the recorder to dart suddenly to the left. The radioactivity technician simply readjusts his pen on the chart, compensates his amplifiers for the loss in sensitivity and continues logging. This occurrence is illustrated in Fig. 3. The "shift" is shown by the dashed line going off the chart to the left and reentering on the right. Depth location of the casing point is indicated by the short line titled "casing shift."

The illustration demonstrates how a characteristic of the neutron curve, once thought to be a nuisance, has provided added information. Log shows that the casing has been set well into the Arbuckle dolomite and that an appreciable porous section has been cased off. It easily could be possible that some, perhaps the best part of the oil section, is trapped behind the pipe. Subsequent testing of the pictured well will either prove or disprove this supposition.

The Arbuckle dolomite (often termed "Siliceous lime") of the Kansas fields is usually the lowest pay horizon and the majority of wells are drilled to this stratum. Common procedure has been to drill with rotary tools to the top of the Arbuckle, and cement casing at that point, subsequently completing the hole with standard tools. In wells completed some years ago, before the common use of drilling-time logs, the improper allowance for sample log created numerous cases similar to that pictured in Fig. 3. The top of the Arbuckle was miscalculated and the casing was set too low.

With practically all of the Arbuckle pools having a strong water drive, in the later stages the handling of large quantities of water presents a difficult and expensive production problem. Currently a number of operators in the various fields such as Silica, Chase, Carmi, and Geneseo have extensive campaigns progressing in which radioactivity logging is playing a useful function. Value of the neutron curve is utilized in this instance. The ability to locate the casing seat and the various porous sections of the Arbuckle provide the needed information for proper placement of cement or plastic plugoff, as the case may be. Further, the picture obtained by the operator may be similar to the one illustrated here, that a part or all of the best producing zone is trapped behind the casing.



Engine assembly showing V-belt drive from shaft extension of back engine to one of the two large mud pumps. The second pump, not shown, is driven off a shaft extension from No. 2 engine

New Diesel-Powered Rig Incorporates Advances in Automatic Control

by Neil Williams

The drilling rig described in this article is one of the largest diesel-powered assemblies ever operated in Oklahoma. Particular reference is made to the three engines, which include a number of features developed during war years but not previously available to the drilling industry. This is the first hookup of three large-sized engines employing pneumatic throttle controls for synchronizing engine speeds.

LOFFLAND BROTHERS CO. recently has assembled a new diesel-powered mechanical rig which embraces a number of developments and refinements in equipment and operating control not heretofore generally available to the drilling industry and particularly to rigs of this size and type. Composed of some of the largest equipment made, the assembly is designed for the deepest drilling currently being undertaken. It is on its first location, a deep wildcat test near Ringwood, Major County, Oklahoma, being drilled under contract for Superior Oil Co. of California.

Power is supplied by three six-cylinder Superior diesel engines, each capable of 285 hp. at 800 r.p.m., continuous rating. Operating through a selective compounding unit, these provide a total of 855 hp. for hoisting, the rotary table drive, and two mud pumps. These are the first large-sized engines of this type to be diverted from military service for drilling-rig use during war years. On them are the various major improvements in engineering design and operation that have been developed during this time and which, for this reason, have not been available on engines for drilling use until now.

Especially new is the Westinghouse pneumatic engine throttle control which automatically synchronizes the speeds of the engines when compounded. This control has been employed before on a few rigs having two-engine hookups, and also on a number of multiple engine installations in other service, most notably on diesel locomotives, but this is the first application involving as many as three engines in drilling. These also are the largest engines in drilling service to which the control has been adapted.

Development of a satisfactory means for synchronizing the speeds of individual diesel engines operating in compound opens the way for more effective and general use of these engines for drilling. Compounding of diesel engines on a drilling rig has been a major problem. Diesel-engine operation is such that a slight variation in fuel feed makes a great difference in engine speed and power. This is not true to such extent with gas or other types of internal-combustion engines, and on them use can be made of available vacuum on their fuel-inlet manifolds to control the volume of fuel to other engines in the compound. With diesel engines there is no vacuum since fuel is injected under pressure.

Speeds of compounded diesel engines may be synchronized by determination and comparison of exhaust temperatures of the individual engines. However, this method is only practical when the engines are

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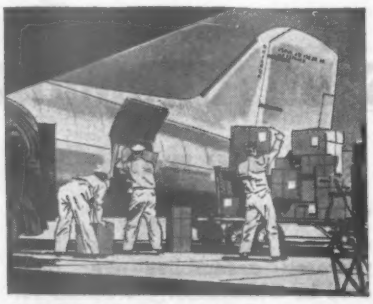

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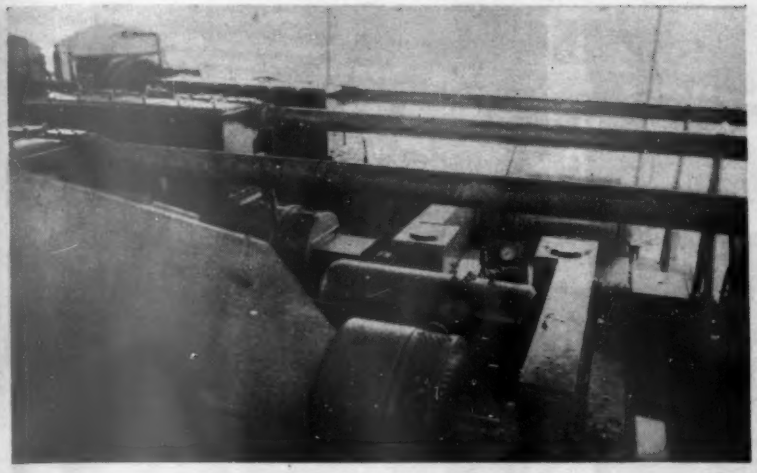


Engine floor showing portions of the three engines, compounding unit assembly and pump drives

operated at constant speeds and loads over relatively long periods. On drilling rigs, speed variations are in such short intervals, particularly in hoisting cycles, that there is not time for determination of these temperatures and making the necessary adjustments.

Hand throttles and foot-pedal accelerators with mechanical connections to the engine fuel or governor controls which generally are used to vary the speeds of drilling-rig engines do not permit close synchronization of engine speeds since the driller must rely largely on feel and sound for evaluation of the distribution of load between the engines. When engine speeds are not synchronized, the load is not distributed equally, and one engine might be underloaded while another is overloaded and actually pulling the first. This results not only in ineffective and inefficient utilization of available power but also in excessive wear and maintenance requirements of the overloaded engines.

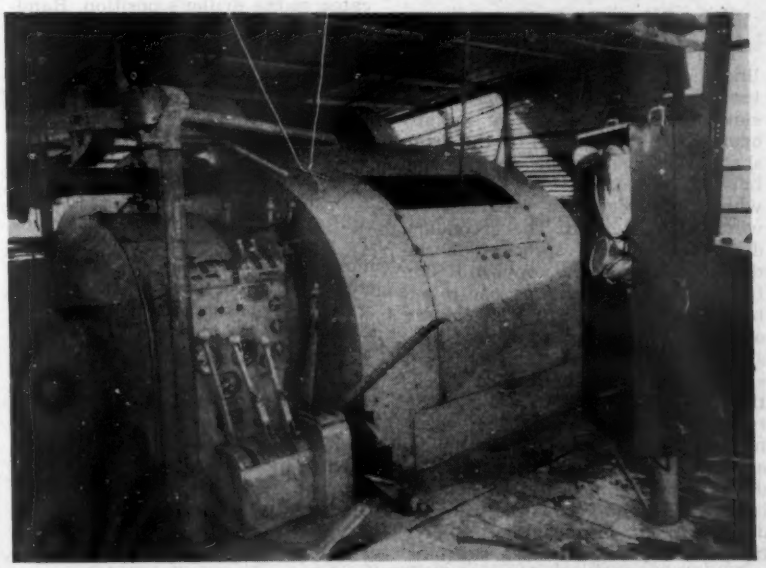
Central Pilot Control

The pneumatically operated throttles of the respective engines are actuated from a central pilot control. Once the speeds of the engines are synchronized by initial throttle adjustments, the pilot, functioning through small air-pressure lines to the throttles, automatically maintains an accurate balance of fuel supply to the engines in compound. Operating controls for the pilot consist of a series of three small valves located at the driller's position. By selective opening or closing of these valves, any combination of engines can be quickly compounded with their speeds automatically synchronized.

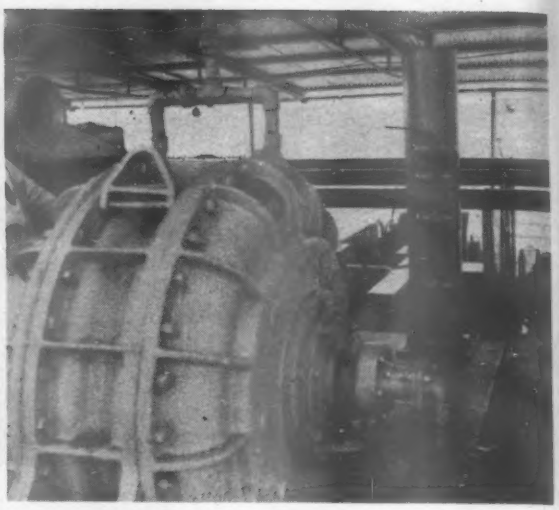
Another new feature on each of the engines is a thermostatically operated radiator bypass valve and cooling-water temperature control. This functions to regulate automatically the volume of jacket water circulated through the radiator or the radiator bypass, according to the tendency of the water to cool or heat, and insures maintenance of the water temperature at a certain fixed level, in this case approximately 155° F. This is particularly important in diesel-engine operation to obtain maximum operating efficiency and uniform engine speed control. The radiator by-pass is specially advantageous when starting the engine while the water is cold. Ordinary practice when starting cold engines is to delay water circulation until the engine becomes heated by running. However, when the water does not circulate, it does not heat uniformly so that there is a tendency for hot spots to develop in the engine, which may prove harmful. With the radiator bypass the water is allowed to circulate continuously without having to pass through the radiator coils. As the temperature of the water rises, the valve gradually opens to the radiator permitting circulation through the coils. The valve is a rotating, two-way-acting type which as it opens to the radiator inlet gradually closes the bypass, and vice versa.

The engines are equipped with full precision bearings, the first in engines of this type in oil-field and drilling use. Also the engines are designed so that the camshaft can be readily removed from the side, eliminating the necessity of having to tear down the radiator to make repairs and replacements on the camshaft. New features include pneumatic overload governors, replacing the conventional fly-ball type of governors. Also included on each engine is a separate radiator for lubricating oil, this being installed immediately behind the water radiator. Engines also are equipped with low-oil-pressure and high-temperature alarms, electrically controlled with gongs for each engine located on the derrick floor near the driller.

The assembly employs a Type 125 Ideal Consolidated draw works and transmission unit, the latest and largest rig put out by National Supply Co. It was designed with a rated capacity for handling as much as 12,500 ft. of 4½-in. drill pipe, al-



Driller's position showing centralized operating controls. The three air valves for pneumatic engine throttle controls are visible in a vertical row at right side of front panel. Consolidated instrument box is at right



Left: Front side of engine showing pneumatically operated throttle. Air-actuating chamber on the floor at the base of the engine is barely visible. On top of the engine is the thermostatically operated radiator bypass valve and water-temperature control. Right: Dual rotor hydromatic brake showing water-volume tank equipped with gravity overflow outlets at different elevations for controlling the water level in the brake

though it is capable of going to much greater depths when smaller-sized pipe is used.

In this rig, the transmission unit, although breaking down into a separate unit for transporting, forms the rear half of the draw works. It contains three shafts with chain drives, and provides six forward speeds. Two reverse speeds are provided by constant-mesh helical gears between the main shaft and jack shaft. Speed selections from the main drive shaft to jack shaft drives, as well as the drive from the line shaft to the cat shaft, are made by multiple step-type jaw clutches.

Two Drives From Line Shaft

Two drives are provided from the line shaft. One, or primary drive, is to the drum shaft on the driller's side and is controlled by an air-operated friction clutch on the drum shaft. It transmits the six primary hoisting speeds, all or several of which may be used progressively when pipe is lifted. The secondary drive is to a quill sprocket on the drum shaft on the opposite side from the driller and is controlled by an air-operated friction clutch on the line shaft. By means of a sliding gear-tooth clutch, the quill sprocket may be connected selectively to the drum shaft or to the rotary drive sprocket. When connected to the drum shaft it makes available a fast overdrive to the drum for hoisting empty block. It is used alternately with the primary drive without disengaging the primary clutch, and effects a substantial saving of time when running pipe. Connected to the rotary drive sprocket, the six transmission speeds are made available for turning the rotary table, all independent of the hoisting speeds.

A 40-in. dual rotor hydromatic brake is mounted independently on the end of the drum shaft extension, and is connected through an air-operated gear-tooth-type flexible disengaging coupling. Brake water is circulated from a volume tank fitted with a succession of gravity overflow outlets placed at different elevations to permit controlling the water level in the brake. With this no more water head is maintained on the brake than needed for braking, thus eliminating excessive drag.

All controls are conveniently located at the driller's position. Hand-operated, variable-pressure air valves located on the panel control the master clutch, primary clutch, and empty-block and rotary clutch. A single valve lever actuates the primary drive and empty-block clutches. As a precaution against possible failure in the air system, all air-operated units also are equipped with manual controls readily accessible for instant use. This includes the primary drum friction clutch which may be manually operated as a positive-drive pin clutch if occasion requires.

Main instruments are grouped on a central box located conveniently to the driller. Instruments on the central box include a tachometer for rotary speed, a mud-pressure gage, weight indicator, and Vernier weight-indicating gage. Both indicating and recording instruments are provided for each operation, indicating gages being on the front of the box and recording instruments in the back.

The assembly includes two large mud pumps, each capable of 350 hydraulic horsepower output at 55 s.p.m. One pump is V-belt driven from a power takeoff on the compound drive transmission shaft extension from the back of No. 3 engine. The second is similarly driven from a shaft extension from the second or middle engine. Through the selective compounding unit, either pump can be operated, however, by either or both engines.

Will Use Largest Hook Made

The rotary table is a 20½-in. unit having spiral-beveled gears and capable of the highest speeds. A 4,300-ton Byron-Jackson hook, the largest made, will be used as soon as a larger-sized traveling block than the one now on the rig can be obtained. The present block, a 66-in., four-sheave type, is being used only temporarily pending arrival of a six-sheave block. The swivel is an Ideal Type R-3 unit. The elevator has 108-in. links.

Derrick is a 156-ft., reworked, steel structure with derrick floor built in 9 ft. above the ground level. The derrick-leg extensions below the floor serve as the corner legs for the substructure. Base of the derrick at the floor level is 32 ft. square. At the ground level it is 34 ft. Engines are mounted on a 6-ft. substructure, having a 3-ft. stepup to the derrick-floor level at the front end for support of the back end of the draw work-transmission unit. The latter foundation is of tubular construction and built in two identical sections, set parallel and lengthwise at right angles to the engine mounting, thus eliminating much vibration. The entire assembly is on a mat base. Pumps are set on plank floored extensions at ground level.

Oil Recovery by Expansion, No Primary Gas Cap

*by Park J. Jones**

Mechanics of Producing Oil, Condensate, and Natural Gas

PART 26 OF A SERIES

This article is limited to reservoirs having no primary gas cap. If a reservoir liquid is undersaturated, a comparatively small per cent of the oil in place can be recovered by expansion of the reservoir liquid in the absence of water encroachment. When reservoir pressure declines below saturation pressure, oil is recoverable by gas expansion. If a declining reservoir pressure is accompanied by water encroachment, gas injection, or water injection, the rate of pressure decline per barrel of oil produced is reduced and oil recovery is higher, relative to a given reservoir pressure, than it would be if there were no reduction in reservoir space.

Methods for estimating oil recovery by expansion are derived and illustrated by examples. Oil recovery is expressed in terms of reservoir pressure and gas-oil ratios. Examples of oil recovery vs. declining reservoir pressure are included for (1) no water encroachment and no gas injection; (2) no water encroachment with gas injection, and (3) water encroachment. The need for controlling gas-oil ratios in producing oil by expansion is illustrated by curves. Oil recovery by gas expansion and gas injection is very sensitive to gas-oil ratios. Under some conditions, a 30 per cent increase in gas-oil ratio can reduce oil recovery by 100 per cent.

Oil Recovery by Expansion of Reservoir Liquid

IF a reservoir has no primary gas cap, the oil recovery by expansion of reservoir liquid is defined by

$$A = C(P_i - P_s) \qquad (1)$$

where

A = barrels of oil available per million barrels of reservoir space

C = compressibility, barrels space/psi./million barrels space

P_i = initial reservoir pressure, psia.

P_s = saturation pressure of reservoir liquid, psia.

$(P_i - P_f)$ = decline in reservoir pressure, psi.

Equation 1 is for one million barrels of reservoir space. Table 1 illustrates oil recovery by expansion of reservoir liquid upon reduction of reservoir pressure down to saturation pressure.

The oil recovery obtained in practice by expansion down to saturation pressure ranges from about 0.0005 per cent of the oil initially in place per pound decline in reservoir pressure up to about 0.01 per cent per pound pressure decline. Therefore, reservoir pressures decline abruptly from their initial values down to saturation pressures if there be no water encroachment. Aside from water encroachment, it follows that ultimate recovery by expansion of reservoir liquid is negligible if saturation pressure is on the order of abandonment pressure.

If the saturation pressure is higher than the abandonment pressure, gas comes out of solution and oil is produced by gas expansion. Oil recovery by gas expansion will now be considered for reservoirs having no primary gas cap.

TABLE 1

	Gravity of oil — Low	Gravity of oil — High
Initial reservoir pressure, P_i	4,000	4,500
Saturation pressure, P_s	2,900	3,400
$P_i - P_s$	1,100	1,100
Volume factor, b_s, at P_i	1.35	2.74
Compressibility, C, barrel/psi./million barrels	13.3	55.3
Oil recovery, barrels oil/million barrels space	14,660	60,830
Oil recovery, per cent of oil in place	1.09	2.22

*Production consultant, Houston.

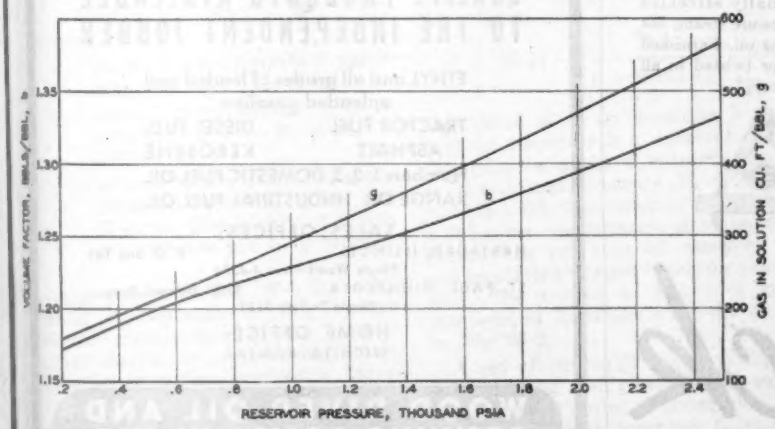


Fig. 26-1—Volume factor (b) for reservoir liquid and (g) cubic feet of gas in solution in a barrel of oil vs. reservoir pressure at 160°F. for a 26.7° A. P. I. oil. After Sage and Lacey

Gas in Solution and Bubble-Point Volume Factor

Oil recovery by expansion from reservoirs having no primary gas cap will be illustrated in this article with the aid of the data shown in Fig. 26-1. In this figure the curve denoted by g gives the cubic feet of gas in solution per barrel of oil. In this example the saturation pressure P_s is 2,500 psia. There are 567 cu. ft. of gas in solution per barrel of oil at the saturation pressure. As reservoir pressure declines, the quantity of gas in solution decreases as shown by the g curve.

The b curve in Fig. 26-1 is the volume factor for a barrel of oil. At 2,500 psia., 567 cu. ft. of gas are in solution and 1 bbl. of oil occupies 1.333 bbl. of reservoir space. As reservoir pressure declines, the volume factor decreases. For example, at 1,000 psia. there are 292 cu. ft. of gas in solution and a barrel of oil

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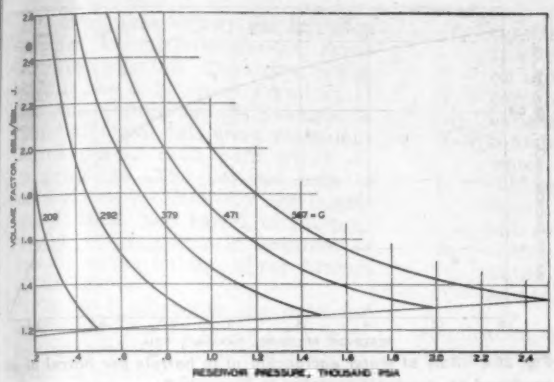

Fig. 26-2—Volume factor for oil and free gas vs. reservoir pressure

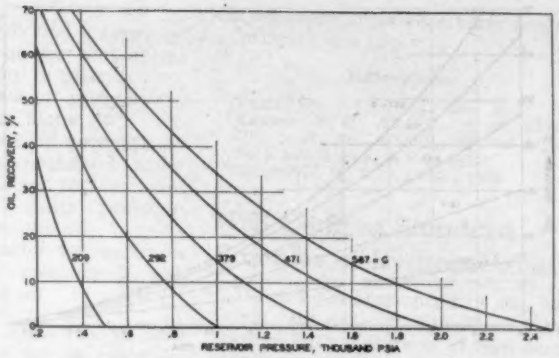

Fig. 26-3—Per cent oil recovery vs. reservoir pressure and (G) gas-oil ratio in a reservoir

with the 292 cu. ft. in solution occupies 1.23 bbl. of space.

Curves of the type shown in Fig. 26-1 are the basic data for estimating oil recovery by expansion, gas injection and water encroachment. If we have the data for the oil in a reservoir, we can estimate oil recovery in terms of average reservoir pressure and the oil and gas produced. The procedure for making such estimates will now be considered in detail. The various steps will be illustrated in terms of the data shown in Fig. 26-1.

Expansion Below Saturation Pressure

Gas comes out of solution when reservoir pressure declines below the saturation pressure of a reservoir liquid. And the reservoir space occupied by 1 bbl. of oil depends on how much solution gas and free gas are associated with the oil. Let the quantity of gas in solution be denoted by g cubic feet per barrel of oil and the quantity of free gas, by G — g where G is the cubic feet of free gas plus solution gas associated with 1 bbl. of oil. The reservoir space occupied by 1 bbl. of oil and its associated gas is defined by:

$$J = b + B(G - g) \qquad (2)$$

where

b = volume factor, barrels of space occupied by 1 bbl. of oil

B = volume factor, barrels of space occupied by 1 cu. ft. of gas = 0.00504 TZ/P

J = volume factor, barrels of space occupied by 1 bbl. of oil and G cubic feet of gas of which g cubic feet are in solution

The curves in Fig. 26-2 are solutions of Equation 2. The bottom curve corresponds to the bubble-point curve for a reservoir liquid. The other curves are for a barrel of oil plus some free gas. The free gas plus the gas in solution is denoted by G. The quantity of gas in solution at any pressure is given by the g curve in Fig. 26-1. The quantity of free gas associated with a barrel of oil is G — g.

Per Cent Oil Recovery vs. Gas in Reservoir

Consider 1 bbl. of reservoir space. The barrels of oil initially in place is equal to $1/b_i$ where b_i is the volume factor at initial reservoir pressure. If we produce C barrels of oil, the following conditions obtain:

Oil initially in place less oil produced = $1/b_i - C$.

The space occupied by the oil not produced = $b(1/b_i - C)$.

Let the cubic feet of gas in solution per barrel of oil be denoted by g and the free gas per barrel of oil by G — g. Then the space occupied by the free gas must equal $(1/b_i - C)(G - g)B$. But the space occupied by the oil not produced and the free gas not produced is equal to 1 bbl., that is:

$$b(1/b_i - C) + (1/b_i - C)(G - g)B = 1 \qquad (3)$$

from which, the oil recovery is:

$$C = \frac{1}{b_i} - \frac{1}{b + B(G - g)} \qquad (4)$$

But the per cent oil recovery r from 1 bbl. of space is equal to 100 b_iC. Hence:

$$r = 100\left[1 - \frac{b_i}{b + B(G - g)}\right] \qquad (5)$$

The value of b_i in Equation 5 for a given reservoir is a constant. For example, the value of b_i in Fig. 26-1 at the initial pressure P_i = 2,500 psia. is 1.333. The value of B, b, and g at a given pressure are also known. Hence, the per cent oil recovery r can be plotted against reservoir pressure. The curves in Fig. 26-3 are solutions of Equation 5 for the data in Fig. 26-2.

A set of curves of the type illustrated in Fig. 26-3 gives the per cent oil recovery from a reservoir in terms of average reservoir pressure and the gas-oil ratio for the oil remaining in a reservoir. Per cent oil recovery could be estimated if we know which curve to use at a given time, that is, if we know the gas-oil ratio for the oil remaining in a reservoir. For field purposes, it is more convenient to express oil recovery in terms of produced gas-oil ratios.

Oil Recovery vs. Produced Gas-Oil Ratio

Per cent oil recovery can be estimated in terms of the produced gas-oil ratio. This statement is reached by the following steps: Let the cumulative produced gas-oil ratio be denoted by R. For reservoirs having no primary gas cap, let R be expressed in terms of the initial solution gas-oil ratio. For example, if the initial solution gas-oil ratio is 567 cu. ft. per bbl. and the cumulative produced gas-oil ratio as of a given day is 1,134 cu. ft. per barrel of oil, the value of R in this case would be 1,134/567 or 2.0.

Let the fraction of oil produced from a reservoir be denoted by r. Then:

The fraction of gas produced = rR.

The fraction of gas not produced = 1 — rR.

The fraction of oil not produced = 1 — r.

So, the gas-oil ratio G in a reservoir is defined by:

$$G = \frac{1 - rR}{1 - r} \qquad (6)$$

from which:

$$r = \frac{1 - G}{R - G} \qquad (7)$$

The curves in Fig. 26-4 are solutions of Equation 7 for the data in Fig. 26-3. A set of curves of this type gives per cent oil recovery in terms of produced gas-oil ratios and average reservoir pressure. Average reservoir pressure means the average pressure on the free gas in a reservoir.

Example 1

Estimate the oil recovery by the

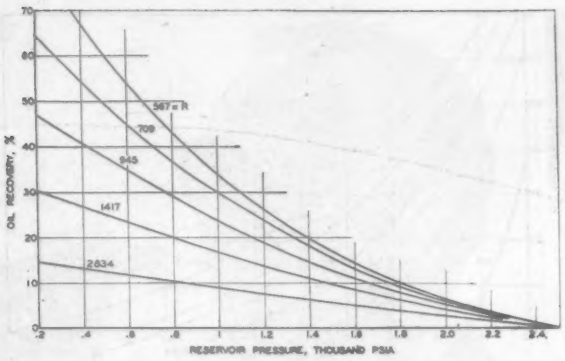

Fig. 26-4—Per cent oil recovery vs. reservoir pressure and (R) cumulative produced gas-oil ratio

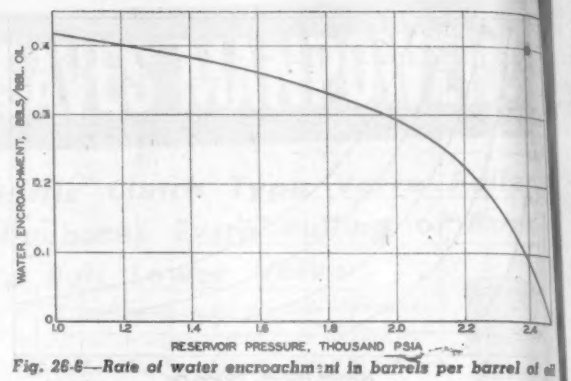

Fig. 26-6—Rate of water encroachment in barrels per barrel of oil produced vs. reservoir pressure in Example 3

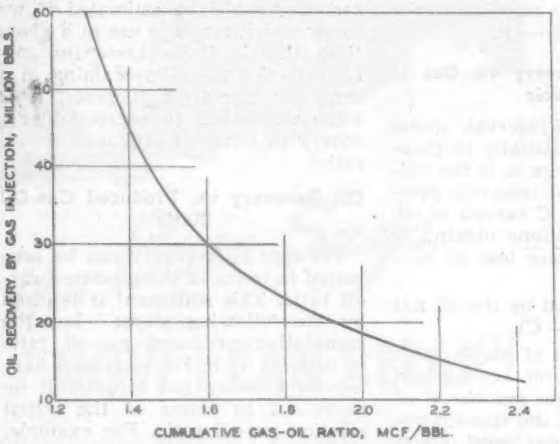

Fig. 26-5—Oil recovery vs. gas-oil ratio in Example 2

time reservoir pressure declines from 2,500 psia. down to 1,000 psia. in the reservoir for which the curves in Fig. 26-4 apply. Solution in Table 2.

TABLE 2

Produced gas-oil ratio equals	2,840	1,420	950	710	567
Per cent oil recovery equals	9.1	16.7	23.8	29.8	35.0
Barrels oil per million barrels in place equals	91,000	167,000	238,000	298,000	350,000

This example illustrates why gas-oil ratios have to be controlled in producing oil by expansion.

Control of Gas-Oil Ratios

Gas-oil ratios can be controlled by several methods. The more important controls are as follows: (1) producing rate from individual wells, (2) producing rate from a reservoir, (3) gas injection, and (4) water injection.

The effect of controlling or shutting in high-gas-oil ratio wells is evident. Control of the oil-producing rate from an entire reservoir may be helpful in two ways. First, gravity may pull the oil downdip relative to free gas. Second, water may encroach and thereby maintain a higher pressure which prevents gas from coming out of solution. Control by gas, or water, injection is similar to water encroachment. Pressure is maintained which reduces expansion. Oil is displaced by the injected fluid.

Oil Recovery by Injecting Gas

Curves of the type shown in Fig. 26-4 may be used to estimate oil recovery by injecting gas. Let r_1 be the per cent oil recovery prior to starting gas injection and R_1 the cumulative gas-oil ratio for the r_1 per cent oil recovery. If r is the cumulative per cent oil recovery at some time after injection is started, then the per cent oil recovery with gas injection is $(r - r_1)$. Let R_2 be the cumulative gas-oil ratio with gas injection and I the cumulative injected gas-oil ratio, then:

$$(r - r_1)(R_2 - I z_1/z) + r_1 R_1 = rB \quad (8)$$

where

z_1/z = compressibility factor ratio, injected gas/gas in place
R = cumulative gas-oil ratio, cubic feet per barrel

If r_1 represents C barrels of oil, the barrels of oil recoverable C_1 with gas injection is defined by:

$$C_1 = C(r/r_1 - 1) \quad (9)$$

Application of Equations 8 and 9 will now be illustrated by an example.

Example 2

In declining from 2,500 psia. down to 1,000 psia., the reservoir represented by the curves in Fig. 26-4 produced 20 million barrels of oil and 28.34 billion cubic feet of gas. How much additional oil can be recovered with gas injection by the time pressure declines down to 400 psia. if 1 M.c.f. of gas is injected for each barrel of oil to be produced. The compressibility factors for the injected and in place gases are the same.

In this example, $R_1 = 2{,}834/2 = 1{,}417$ cu. ft. per bbl. oil. From Fig. 26-4 corresponding to 1,417 and 1,000 psia., $r_1 = 16.6$ per cent. As 20 million barrels represents a 16.6 per cent recovery, each additional 1 per cent recovery with gas injection will obtain 20/16.6 or 1.2 million barrels of oil. The additional per cent recovery by injecting 1,000 cu. ft. of gas per barrel of oil to be produced depends on the gas-oil ratio R_2. By Equation 8:

$$(r - 16.6)(R_2 - 1{,}000) + 16.6 \times 1{,}417 = rR \quad (10)$$

From Fig. 26-4 corresponding to 400 psia. and cumulative gas-oil ratios R the cumulative per cent oil recoveries r and million barrels of oil 1.2r and $1.2(r - r_1)$ are available as in Table 3.

Equation 10 expressed in terms of M.c.f. of gas produced per barrel of oil recovered by injecting 1 M.c.f. per barrel of oil produced is defined by:

$$R_2 = \frac{rR - 2.35}{r - 16.6} + 1 \quad (11)$$

Hence, if we assume corresponding

TABLE 3

R = 567	709	945	1,417 cubic feet per barrel cumulative
r = 66.7	54.2	40.8	26.9 per cent oil recovery cumulative
1.2r = 80.0	65.0	49.0	32.3 million barrels oil cumulative
$1.2(r - r_1) = 60.0$	45.0	29.0	12.3 million barrels by gas injection

values of r and R, we can plot barrels of oil recovery by gas injection against cumulative gas-oil ratios with gas injection. The curve in Fig. 26-5 is the solution of Equation 11 for the conditions of Example 2. The horizontal axis gives the cumulative gas-oil ratio with which oil is produced. The vertical axis is cumulative oil recovery by injecting 1 M.c.f. per barrel of oil produced. Oil recovery is sensitive to gas-oil ratios on the upper branch of the curve.

Fig. 26-5 illustrates the need for controlling gas-oil ratios on gas-injection projects. In addition to the controls already mentioned, control of gas-oil ratios on gas-injection projects is also available to producers, (1) in locating injection wells relative to structure and existing producing wells, and (2) in assigning injection rates to intake wells. For example, a 30 per cent increase in gas-oil ratio for the conditions of Fig. 26-5 reduces oil recovery by 100 per cent.

Oil Recovery With Water Encroachment

If declining reservoir pressures are accompanied by encroachment of water, curves of the type shown in Fig. 26-4 are used to estimate (1) the oil recovery by expansion alone, (2) the oil recovery by water encroachment alone, and (3) the rate of water encroachment. The steps in making these estimates will now be detailed. Let:

Oil initially in place per barrel of space = $1/b_i$.

Total oil recovery expressed as a fraction of the oil initially in place = r.

Oil recovery by expansion alone = r_e.

Oil recovery by water alone = $r - r_e$.

Then at a given time:

Oil remaining in reservoir = $(1 - r)/b_i$.

Oil that would be in a reservoir if there were no water encroachment = $(1 - r_e)/b_i$.

Oil produced by water encroachment alone = $(r - r_e)/b_i$.

So the rate of water encroachment, exclusive of any water produced, in barrels of water per barrel of oil produced is defined by:

$$W = \left(\frac{r - r_e}{r}\right) - \frac{b}{b_i} \qquad (12)$$

where

r = cumulative oil recovery, fraction or per cent of the oil initially in place

r_e = cumulative oil recovery by expansion alone

$r - r_e$ = cumulative oil recovery by water encroachment alone

b_i = volume factor for reservoir liquid at initial pressure, bbl. space/bbl. oil

b = volume factor for reservoir liquid at pressure P, bbl. space/bbl. oil

Application of Equation 12 will now be illustrated by an example.

Example 3

The conditions in the reservoir represented by the curves in Figs. 26-1 and 26-4 are such that per cent oil recovery follows the R = 709 curve but the cumulative gas-oil ratio is 1,417 down to 1,000 psia. Estimate (1) oil recovery by expansion alone, (2) oil recovery by water encroachment alone, and (3) the rate of water encroachment.

Solution: The data are obtained from Figs. 26-1 and 26-2 as shown in Table 4.

TABLE 4

P	2,500	2,250	2,000	1,750	1,500	1,250	1,000
b	1.333	1.313	1.294	1.276	1.259	1.244	1.229
r	0	2.5	6.0	10.0	15.6	22.5	29.9
r_e	....	2.0	4.2	6.8	9.8	13.0	16.6
$r - r_e$	....	0.5	1.8	3.2	5.8	9.5	13.3

Substitution of the foregoing data in Equation 12 gives the curve shown in Fig. 26-6. The indicated water encroachment is exclusive of any produced water.

Per Cent Water Encroachment

The effect of water encroachment is to increase oil recovery relative to a given reservoir pressure. In Example 3 the rate of water encroachment was expressed in barrels of water per barrel of oil produced. Another way of defining water encroachment quantitatively is to express it in per cent of oil produced by water. Thus:

$$W = 100 \left(\frac{r - r_e}{r}\right) \qquad (13)$$

where $\left(\frac{r - r_e}{r}\right)$ is the fraction of oil produced at a given time because of water encroachment. For example, a 40 per cent rate of water encroachment would mean that 60 per cent of the oil recovery at a given time was produced by expansion and 40 per cent by water encroachment.

The foregoing sections illustrated the methods used for estimating oil recovery by expansion, gas injection, and water encroachment from a reservoir having no primary gas cap. The next article will consider oil recovery from reservoirs having a primary gas cap.

References

Hurst, W., A.I.M.E., TP No. 1473.
Kaveler, H. H., A.I.M.E., TP No. 1605.
Old, R. E., Jr., A.I.M.E., TP No. 1529.
Sage and Lacey, A.P.I., 1937.
Schilthius, R. J., A.I.M.E., 1936.

NBS Certifies Standard Samples of Hydrocarbons

It has been announced by the National Bureau of Standards that three National Bureau of Standards standard samples of hydrocarbons,

Methylbenzene (toluene) .....No. 211a
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are now certified with respect to values of refractive index and density, and one of these—2,2,4-trimethylpentane, No. 217 — also for calorimetric heat of combustion. Special certificates will accompany these samples.

Values for refractive index and density are given at 20°, 25°, and 30° C., for air-saturated material at 1 atmosphere; those for refractive index to ±0.00002 at each of seven wave lengths: helium 6,678 and 5,016, hydrogen 6,563 (C) and 4,861 (F), mercury 5,461 (e) and 4,358 (g), and sodium 5,893 (D); and those for density to ±0.00002 g/ml.

The certification for calorimetric heat of combustion, with values applicable to a bomb calorimeter, is primarily for use in establishing heating values of gasoline and other volatile liquid fuels. This sample is available in a special 50 ml. ampoule, in addition to the usual sizes.

NBS standard samples of hydrocarbons, of known high purity, have been prepared and certified for use in calibrating spectrometers and other analytical instruments and apparatus, in the laboratories of the petroleum, rubber, chemical, and allied industries. Since the first group of 15 was announced in January 1944, additional hydrocarbons have been added, so that there are now 46 of these NBS standard samples available. The purity of each sample is stated in the certificate.

Complete information regarding NBS standard samples of hydrocarbons may be obtained by addressing the National Bureau of Standards, Washington 25, D. C.

John E. Dickson, Oklahoma City, has sold his interest in Dickson Oil Co., of which he was founder and president, and has retired. **A. J. Peters** is the new president, with **J. Fred McCown** vice president and general manager.

Donald H. Townsend, formerly general manager of Federal Oil Co., is now a party chief for Brown Geophysical Co., Houston.

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Profit Per Barrel of "Extra" Throughput

How much additional profit do we make when we manage to run a few extra barrels of crude oil through our plant? It seems that extra barrels of throughput are almost clear profit.—L. S.

AT once it may be stated that the advantage of processing crude-oil is great for an inefficient plant, and small for a well-operated plant. If the labor cost is small and if the plant maintenance and depreciation costs are small, not much profit will result. These statements apply particularly to topping-plant operations; they are much less important with respect to cracking plants, and in the case of lubricating-oil plants or other special processing, such generalities cannot apply.

The main costs of processing may be arranged as follows:

1. Fuel.
2. Water.
3. Steam or power.
4. Chemicals and tetraethyl lead.
5. Per barrel royalty.
6. Direct labor (plant and laboratory).
7. Maintenance and insurance.
8. Depreciation, obsolescence and paid-up royalty.
9. Supervisory overhead.

If these costs are stated on a per-barrel basis, they can easily be analyzed for the effect of extra capacity.

Topping Plants

The first five costs are almost directly related to capacity whereas items 6 to 9 are little affected by capacity. Each extra barrel will require the expenditures of items 1 to 5; i.e., fuel, water, steam, chemical and royalty expenses will be incurred. The same is not true of items 6 to 9 because an extra barrel can sometimes be processed without commensurate extra labor, operators, supervision, overhead, maintenance, or depreciation. This simplified situation does not arise unless the extra barrels can be processed without the installation of any substantial new equipment or additions to the plant. Likewise, it is presumed that the equipment will not be so taxed by the extra capacity that it will require excessive maintenance costs or major repairs.

Refiners do not usually have oversize equipment, i.e., they cannot increase the capacity of their plants except by adding equipment. At least they must spend money for rearranging the flow and this involves the attendant cost of learning to operate the revised process. Likewise, any large increase in throughput involves the overworking of some parts of the equipment so that the cost of maintenance may increase sharply. If these two costs (maintenance and depreciation) increase in direct proportion to the increased capacity, then the extra profit by the processing of additional barrels will be only items 6 and 9. Finally, the cost of new equipment or the cost of maintenance may be so greatly increased when extra barrels are processed that a loss rather than a profit is caused by attempts to process more crude oil. In other words, the extra expense introduced into items 7 and 8 (maintenance and depreciation) may exceed the saving that accrues in items 6 and 9 (labor and supervision).

Lastly, the strain of attempting extra capacity, particularly if it involves a very complicated or difficult processing scheme, may lead to excessive supervisory costs. Additional supervision, engineering, instruction of operators, or even additional plant operators, may be required. In such event, no very clear profit remains, except part or all of item 6 (direct labor). As a further complication, the taxes and insurance may increase with the operation of a bigger establishment or by the accumulation of greater profits.

Nevertheless, two typical cases can be outlined which except for small variations are well defined. With respect to topping or distillation plants:

A. An oversize plant.—The profit per barrel will be larger than the regular profit in the amount of the per-barrel cost of the following:

6. Direct cost of labor, routine chemists, etc.
7. Maintenance and insurance.
8. Depreciation, obsolescence and paid-up royalty.
9. Supervisory overhead, including superintendents, accountancy, engineers, research, chief chemist, etc.

B. Minor additions.—Here the extra profit may range down to only:

6. Direct labor
9. Supervision

and in the extreme even this extra profit disappears because of inordinately large increases in depreciation and maintenance, or increases in labor and supervision.

Cracking Plants

In cracking plants a nearly constant recirculation must be maintained regardless of the amount of fresh charge stock handled in the plant. This is necessary in order to maintain proper heating conditions in the cracking still and to prevent the formation of coke in the tubes. If additional charge stock can be fed to the plant without changing the rate of recirculation the extra profit is very large. Theoretically, it amounts to the sum of the following "per barrel" costs whereas in practice it probably does not exceed about 80 per cent of these costs:

1. Fuel.
2. Water.
3. Steam or power.
6. Direct labor.
7. Maintenance.
8. Depreciation.
9. Supervision.

Nevertheless, at low capacities the fuel cost rises sharply because not enough gas is produced to operate the process and it is thus necessary to purchase "outside" fuel. When operating at half capacity the fuel cost may rise by as much as 9 cents per barrel.

Actual Profits

By means of the costs of topping and of cracking given here it will be possible to present the actual profits that arise by the processing of extra oil. Viewed in another way, these profits may be considered as the extra price or the extra delivery charge that can be paid for the additional crude oil that is processed. The percentage of the regular operating cost that may be saved by the processing of an additional barrel of throughput ranges as follows:

Topping (oversize plant)—31-81 per cent.

Topping (some additions)—18-67 per cent.

Topping and cracking—57-75 per cent.

Cracking alone—54-98 per cent.

Such figures do not apply if major additions, major processing changes, or conscious strain is required in order to process additional oil.

The fundamental operating costs upon which these figures are based are shown in Table 1, which shows costs in cents per barrel, and Table 2, which is based on percentage. In terms of cents per barrel on each additional barrel run, the extra profit (above regular profit) is somewhat as follows:

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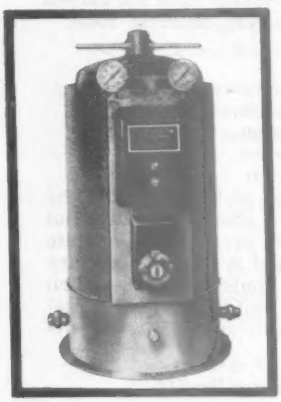

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TABLE 1—COST OF TOPPING AND OF CRACKING ON A PER-BARREL BASIS, CENTS PER BARREL

Cost item—	Topping, cents per bbl. crude: 10,000-bbl. plant Min.	10,000-bbl. plant Max.	1,000-bbl. plant Min.	1,000-bbl. plant Max.	Topping and cracking, cents per barrel crude: 15,000-bbl. plant Min.	15,000-bbl. plant Max.	3,000-bbl. plant Min.	3,000-bbl. plant Max.	Cracking, cents per barrel crude stock: 10,000-bbl. plant Min.	10,000-bbl. plant Max.	2,000-bbl. plant Min.	2,000-bbl. plant Max.
Fuel	0.9	6.0	1.1	7.0	2.8	14.4	2.8	15.4	2.8	14.0	2.8	14.0
Water	...	0.3	...	0.4	0.4	1.0	0.5	1.4	0.7	1.2	0.8	1.6
Steam and power	0.1	1.7	0.1	2.8	0.5	4.4	0.5	5.7	0.4	4.5	0.5	4.9
Chemicals and TEL	0.1	4.8	0.1	4.9	0.2	10.4	0.2	11.0	0.2	9.3	0.2	10.1
Royalty, per barrel	...	...	...	...	...	1.8	...	1.8	...	3.0	...	3.0
Labor	0.5	2.0	1.7	5.1	1.3	5.2	3.0	10.0	1.6	5.4	2.6	8.2
Maintenance and insurance	0.3	1.6	0.5	1.8	0.6	4.6	1.0	5.0	0.7	5.0	1.0	5.4
Depreciation, obsolescence and paid-up royalty	0.4	0.8	0.5	2.6	1.2	3.3	1.8	6.2	1.6	4.2	2.6	6.0
Supervision	0.6	1.3	3.0	6.6	0.6	1.4	2.8	7.1	...	0.2	0.2	0.8
Total	2.9	18.5	7.0	31.2	7.8	46.5	12.6	63.6	8.0	46.8	10.7	54.0

Topping (oversize plant)—1.8-16.1 cents per barrel crude.

Topping (some additions)—1.1-11.7 cents per barrel crude.

Topping and cracking — 5.7-36.5 cents per barrel crude.

Cracking only—7.8-40.9 cents per barrel crude stock.

The wide range of these costs and of the figures in Tables 1 and 2 is not due to uncertainty as to the proper values but to the wide range of operating conditions, wages, utility costs, etc., that are normally encountered. Note that no such wide range is evident in the percentage figures given above.

Cost figures are of little significance unless their basis is clearly understood, and hence the following discussion will indicate what was considered in preparing Tables 1 and 2. A plain average of the figures of Tables 1 and 2 is given in Table 3.

TABLE 2—COST OF TOPPING AND OF CRACKING ON A PERCENTAGE BASIS

Cost item—	Topping: Large	Topping: Small	Topping & crack.: Large	Topping & crack.: Small	Cracking: Large	Cracking: Small
1. Fuel	31.1-32.5	15.7-22.5	36.8-31.0	22.3-24.2	35.0-30.0	26.2-25.9
2. Water	1.6	1.3	5.3- 2.1	3.9- 2.2	8.7- 2.6	7.5- 3.0
3. Steam and power	3.4- 9.2	1.4- 9.0	6.6- 9.4	4.0- 9.0	5.0- 9.6	4.7- 9.1
4. Chemicals and TEL	3.5-26.0	1.5-15.8	2.6-22.4	1.6-17.3	2.5-19.8	1.9-18.7
5. Royalty, per bbl.	.....	.....	3.9	2.8	6.4	5.5
6. Labor	17.2-10.8	24.3-16.4	17.1-11.2	23.8-15.7	20.0-11.5	24.3-15.2
7. Maintenance, etc.	10.3- 8.6	7.1- 5.4	7.9- 9.9	7.9- 7.9	8.8-10.7	9.3-10.9
8. Depreciation, etc.	13.8- 4.3	7.2- 8.4	15.8- 7.1	14.3- 9.8	20.0- 9.0	24.2-11.1
9. Supervision	20.7- 7.0	42.8-21.2	7.9- 3.0	22.2-11.1	0.4	1.9- 1.5

TABLE 3—AVERAGE COST OF PROCESSING

	Topping: Ct./bbl.	Topping: Per cent	Topping & crack.: Ct./bbl.	Topping & crack.: Per cent	Cracking: Ct./bbl.	Cracking: Per cent
1. Fuel	3.7	24.7	8.9	27.3	8.4	28.1
2. Water	0.3	2.0	0.8	2.4	1.1	3.7
3. Steam and power	1.2	8.0	2.8	8.6	2.6	8.7
4. Chemicals and TEL	2.5	16.7	5.4	16.5	5.0	16.7
5. Royalty, per bbl.	...	...	0.9	2.8	1.5	5.0
6. Labor	2.3	15.3	4.9	15.1	4.4	14.7
7. Maint. and insurance	1.0	6.7	2.8	8.6	3.0	10.0
8. Depreciation, obsolescence and paid-up royalty	1.1	7.3	3.1	9.5	3.6	12.1
9. Supervision	2.9	19.3	3.0	9.2	0.3	1.0
	15.0	100.0	32.6	100.0	29.9	100.0

TABLE 4—PROFIT BY PROCESSING EXTRA OIL, CENTS PER BARREL OF EXTRA OIL

Cost item—	Topping, cents per bbl.: 10,000 bbl. Min.	10,000 bbl. Max.	1,000 bbl. Min.	1,000 bbl. Max.	Cracking, cents per bbl.: 10,000 bbl. Min.	10,000 bbl. Max.	2,000 bbl. Min.	2,000 bbl. Max.
1. Fuel	...	...	...	...	2.8	14.0	2.8	14.0
2. Water	...	...	...	...	0.7	1.2	0.8	1.6
3. Steam	...	...	...	...	4.0	4.5	0.5	4.9
4. Chemicals	...	...	...	...	...	...	...	...
5. Royalty	...	...	...	...	...	...	...	...
6. Labor	0.5	2.0	1.7	5.1	1.6	5.4	2.6	8.2
7. Maintenance	*0.3	*1.6	*0.5	*1.8	*0.7	*5.0	*1.0	*5.4
8. Depreciation	*0.4	*0.8	*0.5	*2.6	*1.6	*4.2	*2.6	*6.0
9. Supervision	0.6	1.3	3.0	6.6	...	0.2	0.2	0.8
An oversize plant	1.8	5.7	5.7	16.1	7.8	34.5	10.5	40.9
Minor additions	1.1	3.3	4.7	11.7	6.5	25.3	6.9	29.5
At half capacity	...	...	...	...	6.8	25.5	9.5	31.9
On a percentage basis:†								
An oversize plant	62.0	31.0	81.0	52.0	98.0	74.6	98.0	76.0
Minor additions	38.0	18.0	67.0	37.0	81.0	54.0	64.0	55.0
At half capacity	...	...	...	...	85.0	54.0	89.0	59.0

*These items left out for a plant which requires minor additions. †Percentage of the normal per-barrel cost of operation.

Basis of Costs

The size of plant affects processing cost mainly in items 6 to 9, i.e., labor, maintenance, depreciation, obsolescence, and supervision. Obviously only a few more operators and supervisors are required to operate a large plant than to operate a small one. At least one superintendent and one chief chemist are required in a plant irrespective of its size. Depreciation and maintenance are lower in a large plant because a large one can be built for a lower per-barrel cost than a small one, and it will only be a larger plant, not necessarily more complicated than a small one. Construction costs of $65 per barrel (1,000 b.p.d.) and $16 per barrel (10,000 b.p.d.) were used and depreciation (or obsolescence) was based on 8 to 20 years. Labor rates of 60 cents to $1 per hour were used but the main range in the labor cost (item 6) was caused by the number of operators employed. The labor cost represents all plant workmen and all routine laboratory chemists, but it does not include superintendents, engineers, the chief chemist, and the office force. The wages of these men are included under item 9 (supervision) but the supervision item does not include executives, salesmen, advertising costs, etc. The supervision cost in cracking plants was considered to be very small because the same supervisors used for the topping plant are usually sufficient for both plants.

Fuel cost.—This varies because of the price of fuel (14 to 30 cents per million B.t.u.) but also because of the different amounts of heat required. Thus, the lowest values for a topping plant are for a low pipe-still outlet temperature (450° F.), small percentages vaporized (40 per cent), a large amount of heat exchange (220° F.), and a high pipe-still efficiency (70 per cent); whereas the highest fuel costs are for an expensive fuel, a high pipe-still outlet temperature (700° F.), large percentages vaporized (70 per cent),

a low exchanger temperature for such a plant (300° F.) and a pipe-still efficiency of only 55 per cent.

In cracking plants the factors of pipe-still efficiency, price of fuel and temperature range, affect the fuel cost just as in topping plants, but in addition there are the factors of recirculation and of gas production. Recirculation or recycling ranges from 3.5 parts pumped to 1 part of feed, up to 5 parts recirculated. When producing only 35 per cent of gasoline, the gas production is so low (3 per cent gas and unaccounted for) that about a third of the fuel required for the plant must be purchased, whereas at 65 per cent gasoline production the cracking plant makes more gas (12 per cent gas and unaccounted for) than required for its operation. Except for the small purchase of fuel required in some plants and the small excess of fuel generated in other plants, the fuel cost for cracking plants was considered as the value of the topped crude oil that disappeared in the processing. The value of topped crude was taken as 60 cents per barrel (minimum) and $1.50 per barrel (maximum).

Water cost.—Substantially all of the heat contained in the fuel except the loss to stacks, is removed by cooling water. Thus high water costs arise if the fuel cost is high and if the temperature range through which the water rises is small (30° F.). The cost of water was taken as 0.15 to 1 cent per 1,000 gal. (not including labor).

Steam or power cost.—In topping plants the process (or "live") steam ranges from 2 lb. to 54 lb. per barrel but in cracking plants substantially no processing or even stripping steam is used. Much additional steam is used for pumping (or its equivalent in electrical power); from 9 to 33 lb. per barrel. The cost of steam generation was taken as 10 to 20 cents per 1,000 lb. (not including labor).

Chemicals and tetraethyl lead cost.—This comprises the chemicals required for desalting, sweetening, corrosion neutralizing and the ethyl fluid used for the gasoline. Obviously, such cost can range widely. Inasmuch as ethyl fluid in many plants is a source of profit rather than a cost, perhaps it should not have been included as a processing cost.

Extra Profit by Mass Production

The general situation was explained earlier in this discussion. In topping plants the maximum saving by processing extra crude oil consists of the per-barrel cost of items 6 to 9, i.e., labor, depreciation, paid-up royalty, and supervision. Thus, Table 4 was prepared by summing these items from Table 1. If minor additions are required, the extra profit consists of only items 6 and 9.

In cracking plants the extra profit with each extra barrel of throughput consists of all of the items except 4 and 5. Such profits are based on the assumption that extra barrels can be processed without making major additions to the plant equipment. If perchance the cracking plant is operating at only half of its capacity, the extra profit that arises by handling additional oil can be increased by 1 to 9 cents per barrel because of greater gas production, i.e., at half capacity it is necessary to buy fuel for plant.

Electronics

(Continued from page 86)

voltage varies with the relative densities of areas within the body.

In radiography the shadow picture is produced on film, which permits better penetration of the X-rays and results in sharp contrast and great detail. Industrial X-ray apparatus ranging in power up to 2,000,000 volts are used in the field of nondestructive testing. Application of X-rays to industrial use are of three classes:

1. Radiography—a shadow image of the object examined recorded on a photosensitive film.

2. Fluoroscopy — observation of a transient image produced by X-ray on a fluoroscopic screen.

3. Diffraction—in which the composition and characteristics of all types of materials can be studied by analysis of pattern, produced on films by X radiation.

Inspection of casting, in addition to assuring high quality of the finished part, may point the way to repairs that might salvage a large or complicated body. Inspection of Class 1 welding is a routine procedure among manufacturers of pressure vessels. Radiography will disclose such defects as entrapped slag, porosity and cracks, as well as lack of fusion.

Crystal analysis by diffraction methods is now widely used to disclose behavior characteristics of materials under various conditions of use, and indicate chemical composition that facilitates classification of ores and other raw materials. Substances having almost the same chemical analyses may show very different crystal structures. Only minute samples are required for testing in the diffraction camera.

The cathode-ray tube is the most important component both of the television receiver and of the cathode-ray oscilloscope. Its elements include an envelope, shaped like a megaphone, and a fluorescent screen across its mouth. Inside the tube are a cathode, a control grid, two accelerating anodes, and two sets of deflecting plates. It is often called the electron "gun." It produces a beam of electrons which is directed against the fluorescent screen, producing by its impact there, a luminous spot. This spot can be made to move up and down by impressing varying voltages on vertical deflection plates, and lateral movement of the spot can be produced by varying voltages on horizontal deflecting plates. The shapes and potentials of the anodes act as a converging lens, which brings the electrons to a sharp focus on the fluorescent screen. Spot intensity is controlled by the grid potentiometer, and spot focusing by the anode potentiometer. The degree of deflection is exactly proportional to deflecting voltage, thus it follows that the cathode-ray tube can be applied to electrical analysis. The voltages to be studied may be impressed directly on the deflecting plates, or first amplified. A sweep oscillator is provided, in the case of the oscilloscope, in order that a traced wave form may appear on the screen as a function of time.

The cathode-ray oscillograph was designed originally for the study of voltage and current wave form, but finds many other useful applications. Its advantages over other types include its wide frequency range, which extends into radio frequencies, its very high input impedance, its ease and convenience of operation, its portability, and its comparatively low cost.

Modern television reception is based on the ability of a cathode-ray tube to translate variations of current strength into proportional variations of light brilliance. When a signal voltage is applied to its control grid, spot brilliance varies. The Iconoscope is a special form of cathode-ray tube. Instead of containing a fluorescent screen at one end, it terminates instead in a mosaic of thousands of tiny photocells. Each of these cells produces an electric charge, which is proportional to the light or shadow existing in the particular section of a visual image which is optically focused on the entire mosaic.

References

1. Cockrell, W. D., "Industrial Electronic Control," McGraw-Hill Book Co., New York, 1944.
2. Remick, A. E., "Electronic Interpretations of Organic Chemistry," John Wiley & Sons Co., Inc., New York, 1943.
3. Hudson, R. G., "Electronics," John Wiley & Sons, Inc., New York, 1932.
4. Kloeffler, R. G., "Principles of Electronics," John Wiley & Sons, Inc., New York, 1942.
5. Chaffee, E. L., "Thermionic Vacuum Tubes," McGraw-Hill Book Co., Inc., New York, 1933.
6. Reich, H. J., "Principles of Electronic Tubes," McGraw-Hill Book Co., New York, 1941.
7. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., "Electrons at Work," 1943.
8. General Electric Co., Schenectady, "Industrial Electronics," 1944.

Prepacking Gravel Screens

Method of making a prepacked screen.—Prepacked gravel screens are constructed of two perforated pipes, a smaller-diameter one being set inside the larger. The smaller is in most cases the size of the well tubing or wash pipe, and the larger is limited in size to a diameter which will run easily inside the well casing. The smaller pipe is centered inside the large by appropriate pipe fittings, and the annular space between the two pipes is filled evenly and completely with carefully prepared and correctly sized gravel (Fig. 1). The screens in most cases are made up in lengths like ordinary pipe, each section is gravel packed separately, and the sections are connected together and run into the well in the usual way. The thickness of the gravel pack ranges from ½ to 2 in.

According to Donald Smith[4], the usual procedure in California is to specify a prepacked screen which will pass through an 8⅝-in. water string where this size string is in the well. He uses, in most cases, a 7¼-in. o.d. outer pipe set on a 5½-in. liner. Allowing for the thickness of the wire screen on the outside of the prepack, the actual thickness of the fine gravel is ⅝ in. If 1 in. or less of gravel is used, he says the particles must be much smaller than those specified for an ordinary gravel fill in order to retain silt and fine sand.

It is important in packing the fine-grained gravel that the screen pipe be set vertically and jolted or tapped sufficiently so that the gravel will completely settle and fill the annular space. Otherwise, while running the screen into the hole, the gravel may settle and leave an open space in the screen through which fine sand may migrate. For this reason, it is best practice to pack the gravel oil wet.

Choice of type of screen.—The question of whether to use a prepacked gravel screen (Fig. 1) or conventional-type gravel pack (Fig. 2) depends largely upon the condition of the oil sand and a number of operating factors. If the oil sand is fine grained and loose so that the walls of the well cave and the loose sand flows, it is thought to be better to use the ordinary type of gravel pack. If the hole stands up fairly well and there are paraffin troubles or sand-clogging difficulties due to iron sulfide or other precipitates which sometimes form in old wells, the prepacked screen has its advantages. If fluid levels are low and paraffin content of the oil is high, paraffin may clog gravel and lower the permeability of the screen greatly. In still other places bacteria get into old wells, reduce sulfates, and precipitate black iron sulfide which tends to clog and even cement gravel packs. If a prepacked gravel screen is set in the usual manner and connected with a wash pipe or tubing string, it can be backwashed by pumping oil or paraffin solvent down the tubing through the gravel screen and up to the surface through the annular space between the tubing and casing. In this way the gravel pack can be backwashed, cleaned, and treated with bacteriacides as often as desired. If desired, the backwash line at the well head can be connected with a small filter and the oil or paraffin solvent cleaned, recovered, and reused. This opportunity to clean and treat the screen and walls of the oil sand is a main advantage of the prepacked screen.

On the other hand, if the oil sand tends to slump or flow, then the conventional gravel-filled hole is better. If the annular space between the screened flow line and oil sand is filled with gravel, the wall of the hole is supported and movement of the sand is prevented. With the prepacked screen there is the same size annular space as in an ordinary wire screen, and if the fine sand caves against the prepacked screen, all advantages of an enlarged hole are lost. In many places the loose sand packs against the screen and wedges against the pipe so tightly that the prepacked screen cannot be pulled, and reconditioning of the well is made difficult.

References

1. Brasher, Fred N., Gravel Packing 6,400-ft. Southern Louisiana Flowing Wells: Oil Weekly, pp. 22-23, April 10, 1939.

2. Sawdon, W. A., Gravel Packing Oil Wells: Pet. Eng., pp. 86-92, January, 1938.

3. Sawdon, W. A., Improvements in Methods of Gravel Packing Oil Wells: Pet. Eng., pp. 95-96, January 1939.

4. Smith, D. M., A Review of Gravel-Packing Methods: California Oil World, vol. 38, pp. 3-11, March, 1945.

5. E. H. Short, Jr., Gulf Coast Innovations in Gravel-Packing Technique, The Oil and Gas Journal, pp. 97-98, February 10, 1945.

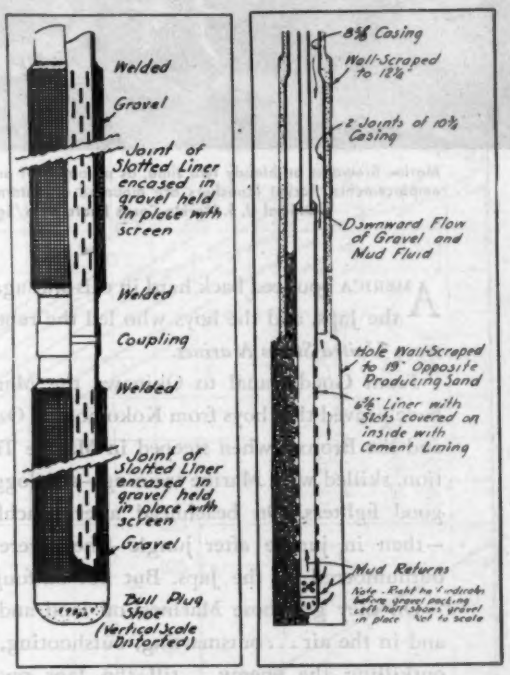
Welded
Gravel
Joint of Slotted Liner encased in gravel held in place with screen
Welded
Coupling
Welded
Joint of Slotted Liner encased in gravel held in place with screen
Gravel
Bull Plug Shoe
(Vertical Scale Distorted)
8⅝ Casing
Wall-Scraped to 12¼"
2 Joints of 10¾ Casing
Downward Flow of Gravel and Mud Fluid
Hole Wall-Scraped to 19" Opposite Producing Sand
6½" Liner with Slots covered on inside with Cement Lining
Mud Returns

Fig. 1: (Left) Construction of a prepacked gravel screen. The inner pipe is perforated and screened. The gravel-pack is 1 in. thick. The outside diameter of the gravel-packed pipe is 8⅝ in. In the Wilmington field, California, the gravel used in the screen will pass through a ¼-in. sieve and be retained on a ⅛-in. sieve. Fig. 2: (Right) Conventional-type gravel-pack. The perforated pipe is centered in the hole by using a centralizing spring guide or by setting the cement casing shoe in a central rat hole. (After W. A. Sawdon)

Series prepared by F. B. Plummer, professor, petroleum engineering school, University of Texas

Fireworks ON WHEELS

Marine fireworks on bloody Iwo Jima, as pyramids of projectiles rain death on Japanese emplacements. Rocket launchers are mounted on International four-wheel-drive trucks. —Official U. S. Marine Corps Photo by S/Sgt. Rex M. Robbins.

AMERICA bounced back hard in this war against the Japs, and the boys who led the rebound were *United States Marines.*

From Guadalcanal to Okinawa the Marines have proved that boys from Kokomo, the Ozarks and the Bronx—when steeped in Marine Tradition, skilled with Marine training—are doggone good fighters. On beachhead after beachhead—then in jungle after jungle—they were far outnumbered by the Japs. But not outfought!

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The Refiner's Notebook

A WEEKLY FEATURE OF THE OIL AND GAS JOURNAL

Heating Liquid Oils

THE heat required (British thermal units) to raise the temperature of 1 lb. of oil through 1° F. is known as the specific heat. Fig. 1 shows specific heats of mixed or intermediate base oils. Specific heats for other stocks can be determined by use of the correction factors (multipliers) shown in the lower right hand corner of the figure. The characterization factor used for the correction factors was mentioned in the Refiners Notebook No. 20 under Comparison of Crude Oils. Its values for some typical materials are:

Paraffin hydrocarbons	12.7
Paraffin-base oils	12.2-12.5
Intermediate-base oils	11.8-12.0
Cracked gasolines	11.5-11.8
Naphthene-base oils	11.0-11.5
Cracking-plant feeds	10.5-11.5
Recycle stocks	10.0-11.0
Cracked residuums	9.8-11.0
Benzene	9.8
Coal tar	9.5- 9.8

As an approximation the heat required to heat 1 gal. of oil through 1° may be taken as 4 B.t.u. This value ranges from 3 to 6 but the value of 4 is an average based on the most frequently used stocks and temperature ranges.

Example—4,670 bbl. per day of 41° A.P.I. paraffin-intermediate crude oil which has a characterization factor of 12.1 is being heated from the storage tank temperature of 66° F. to 242° F. (without vaporization) in a heat-exchange system. The density of 41° A.P.I. material is 6.83 lb. per gallon.

$$4{,}670 \times 42/24 \times 6.83 = 55{,}800 \text{ lb./hr.}$$

$$\text{Ave. temp.} \frac{242 + 66}{2} = 154° \text{ F.}$$

$$\text{Sp. Ht.} = 0.52 \times 1.015 = 0.527$$

$$\text{B.t.u./hr.} = 55{,}800\ (242 - 66)\ 0.527 = 5{,}170{,}000$$

Had the material been pure paraffin hydrocarbons the heat required would have been 5,350,000 B.t.u.; or had it been of coal-tar origin, 4,480,000 B.t.u.

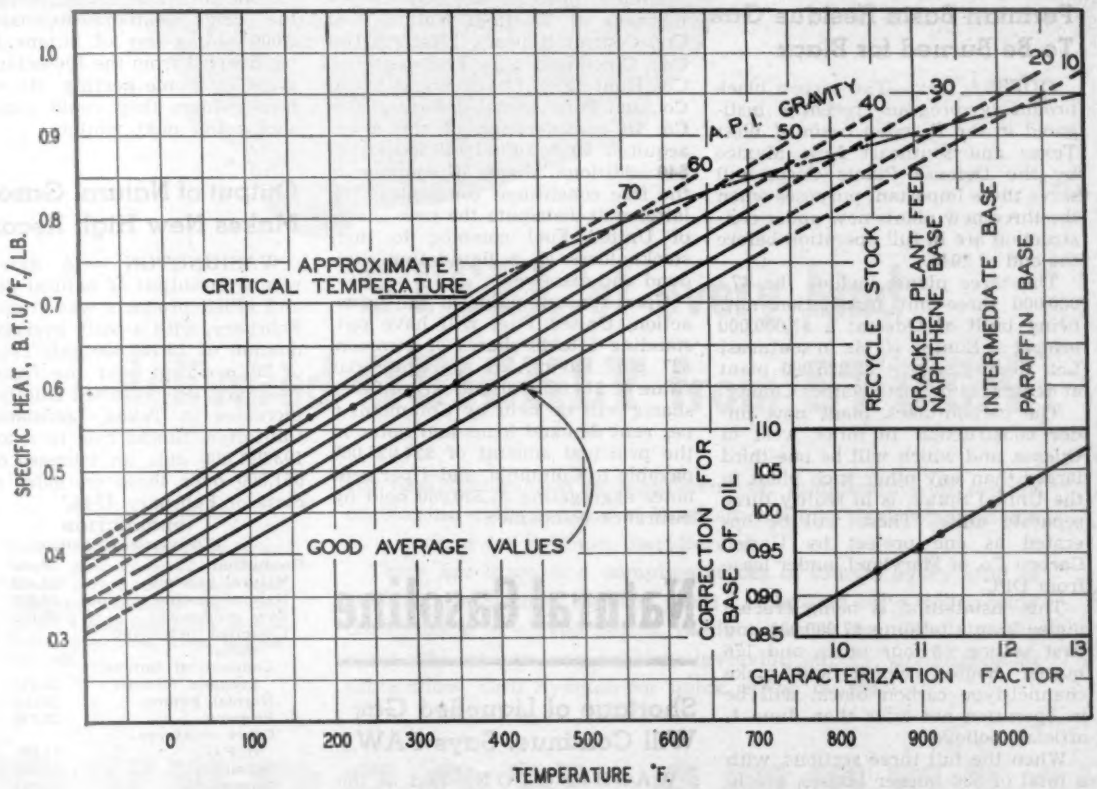

Fig. 1—Specific heat of liquid Mid-Continent oil stocks with factors for other oils

No. 40 in a series by W. L. Nelson, professor of petroleum refinery engineering, University of Tulsa

Natural Gas

Gas May Become Too Valuable for Fuel

AUSTIN, Tex.—The prospect that natural gas may become so valuable that it could not be used for fuel was expressed here last week by Dr. George H. Fancher, professor of petroleum engineering at the University of Texas.

Speaking in the final session of the Texas Industrial and Commercial Research Council, Dr. Fancher said, "natural gas is a new resource of raw materials for essential ingredients in the manufacture of synthetics. It must not only serve old industries now coming to Texas but it also must supply self-created new industries making new products."

"The eventual recovery of every barrel of crude oil possible from every oil field in Texas is a solemn obligation to the people of Texas," Fancher said.

Permian Basin Residue Gas To Be Burned for Black

ODESSA, Tex.—The carbon black producing program recently instigated in the Permian basin of West Texas and southeast New Mexico by the Defense Plants Corp. will serve three important purposes when the three new plants now under construction are in full operation before the end of 1945.

The three plants include the $7,000,000 three-unit installation now being built at Odessa; a $3,000,000 project at Eunice, N. M., in southeast Lea County, and a $2,225,000 plant at Seagraves in north Gaines County.

The carbon-black plant now under construction 10 miles west of Odessa, and which will be one-third larger than any other such plant in the United States, is in reality three separate units. These will be operated as one project by United Carbon Co. of Maryland, under lease from DPC.

This installation is being erected under grants totaling $7,000,000 and first section of four units, and 176 burner houses, which will make channel-type carbon black, will be in operation not later than June 1, officials believe.

When the full three sections, with a total of 536 burner houses, are in use before end of this year, between 90 and 100 million cubic feet of dry, sour gas will be used annually in making 56,000,000 lb. or around 800 railroad carloads of carbon black annually.

The gas to be processed at Odessa will be obtained from natural gasoline plants using residue gas from four Ector County pools—North Cowden, Goldsmith, Judkins and Foster.

To bring the gas from the natural gasoline plants to the carbon black facilities, 56 miles of 24 and 26-in pipe line are being laid.

United Fuel May Absorb Five Columbia Concerns

PHILADELPHIA. — United Fuel Gas Co. will absorb five subsidiaries of Columbia Gas & Electric Corp., and continue as the surviving entity if a declaration of purposes filed here last week with the Securities and Exchange Commission is approved. Hearing has been scheduled May 7.

United proposes to acquire the business of Warfield Natural Gas Co., Central Kentucky Natural Gas Co., Cincinnati Gas Transportation Co., Huntington Development & Gas Co., and Point Pleasant Natural Gas Co. In consideration of the assets acquired, United Fuel will issue 218,840 additional shares of common to the five constituent companies. The latter will distribute the new shares of United Fuel common to their stockholders as a liquidating dividend and dissolve.

Upon consummation of the transaction, United Fuel will have outstanding 518,840 shares of common, $27 par, having an aggregate par value of $14,008,680; all except 243½ shares will be held by Columbia; 6 per cent demand loans and notes in the principal amount of $24,025,000 payable to Columbia, and 4 per cent notes aggregating $1,500,000 held by insurance companies.

Natural Gasoline

Shortage of Liquefied Gas Will Continue, Says PAW

WASHINGTON.—End of the European war will not increase the supply of liquefied petroleum gases for home use, nor will home owners be allowed to make new installations for use of these gases, according to the Office of Petroleum Administration for War. Increased demands in connection with the war in the Pacific preclude easing of restrictions, Deputy Administrator Ralph K. Davies said.

Liquefied petroleum gases, Davies explained, are composed of butane, propane, or their mixtures necessary to the war program. Butane is an important ingredient of high-octane aviation gasoline and of synthetic rubber. Propane is becoming increasingly important as a raw material in making chemicals. Huge quantities of propane are used in war plants in the heat treatment of metals and for other purposes. In addition, new demands have been made upon the liquefied petroleum gas industry for propane in war plants in northern industrial regions, which formerly had ample supplies of natural gas, but which now are short of that product.

Production of 100-octane aviation gasoline will continue at maximum rates after VE Day and will require even more butane than last winter, Davies said.

The demand for military and civilian use of these gases is so great and the balance between the two so delicate that it may easily be disrupted, Davies pointed out. At one time last winter, because of the cold weather, approximately 2,000 bbl. a day of butane had to be diverted from the 100-octane program for home heating. He warned householders they could expect no such relief next winter.

Output of Natural Gasoline Makes New High Record

WASHINGTON. — A new high record in output of natural gasoline and allied products was attained in February, with a daily average production of 13,130,000 gal. This gain of 20 per cent over the figure for February 1944 resulted chiefly from increases in Texas, Louisiana and California. Stocks rose to a total of 193,941,000 gal., an increase of 15,651,000 over those on hand at the close of February 1944.

PRODUCTION
(Thousands of gallons)

Production:	Feb.	Jan.
Natural gasoline	161,409	177,932
Natural-gasoline mixture	26,690	28,015
Raw condensate	35,632	42,513
Liquefied petroleum gases:		
Commercial butane-propane mixture	25,424	31,135
Normal butane	38,205	39,464
Propane	22,446	21,878
Other mixtures (L.P.G.)	11,562	11,734
Isobutane	13,229	15,868
Isopentane	12,053	13,237
Finished gasoline and naphtha	17,824	18,552
Other products	3,158	3,014
Total	367,632	403,342

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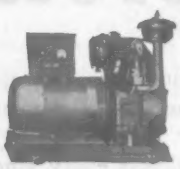
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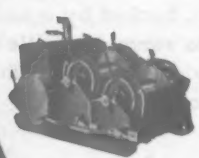
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REFINING

Refiners Cost Group to Submit Report May 15

WASHINGTON. — The National Refiners Industry Advisory Committee is expected to submit both recommendations and a final draft of a cost survey form to the Petroleum Price Branch of the Office of Price Administration in a meeting in Washington May 17.

A subcommittee of the group will meet here May 15 and present its recommendations to the full committee 2 days later. Upon receipt of the cost-study form, OPA expects to be able to mail it to selected refiners within a few days and hopes to have the results shortly after results of the crude-oil questionnaire, due May 1, are tabulated.

Gasoline Coupons, Checks Go to Central Office

WASHINGTON.—A gasoline dealer operating more than one place of business may send his ration coupons and checks to a central office if he obtains approval from his Office of Price Administration district director, the OPA announces. The district director will grant approval if he finds that the coupons will be better protected than at the individual stations, and that keeping them at the central office will not unduly interfere with audits of the stations. The change was made to reduce danger of loss of coupons and checks.

Synthetic-Fuel Budget Slashed to $6,000,000

WASHINGTON. — A $13,000,000 synthetic fuel development program of the Bureau of Mines has felt the axe of the House appropriations committee.

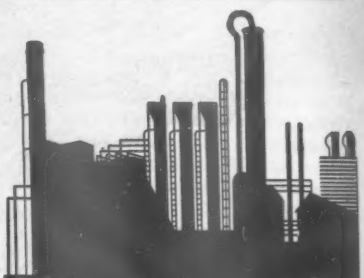
In its report on the Interior Department appropriations bill, the committee cut the budget request by $7,000,000, declaring that since Germany appears to be collapsing the bureau "should begin to readjust itself for a one-front war and postwar operations."

The effect of the reduction on the synthetic-fuel program, if it stands, was not at once clear. Dr. R. R. Sayers, bureau director, had told the committee the money was "badly needed" for the construction of demonstration plants.

Plans of the bureau called for a demonstration plant to extract fuel from oil shale near Rifle, Colo., and an oil-shale research laboratory at Laramie, Wyo.

Leonard Refineries, Inc. Award Expansion Contract

SAGINAW, Mich. — Leonard Refineries, Inc., of Alma, Mich., announced last week that contract has been awarded for a $700,000 catalytic cracking unit for production of 100-octane aviation gasoline base stock. Construction is to start within 2 months and completion is expected 8 months thereafter. War Production Board priority has been obtained.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Only 22 Grades of Asphalt And Road Oil Permitted

WASHINGTON. — Refiners are limited to the manufacture of only 22 grades of asphalt and road oil, instead of the 55 to 60 usually made, as the result of an order issued by Petroleum Administration for War to speed up movement of tank cars. Plants may produce eight specified grades of paving asphalt, nine of cutback asphalt, and five of slow-curing road oil. The directive became effective May 1.

By limiting the number of grades of asphalt, it will be possible to increase the efficiency of tank-car operations, it was explained. More tank cars can be filled at loading racks if a train of cars is moved through the same rack, as against the previous practice of moving cars from one rack to another for the blending of a special grade of asphalt. The reduction of grades, which indirectly eliminates blending, will also speed up operations by requiring less switching of tank cars in the refining and terminal yards.

An additional advantage of the limitation of grades is that cars en route to one destination can be shifted to another destination if necessary, a practice that is not often possible when many grades of asphalt are manufactured.

Louisiana Toluene Plant To Yield 1,600 Bbl. Daily

Production of about 1,600 bbl. per day of toluene will be added to the national total capacity next February when Cities Service Refining Corp. completes construction of Defense Supplies Corp.'s new unit now under way at the Lake Charles, La., refinery. The plant, said W. Alton Jones, president, Cities Service Oil Co., in reporting to stockholders, will cost $20,000,000.

He said work on the plant site started in March and that completion is scheduled February 1, 1946. The unit will be operated by Cities Service as agent for DSC. Last year, Cities Service started operation of a complete new refinery at Lake Charles, a plant built from the ground up for the special purpose of manufacturing maximum volumes of aviation gasoline. Besides toluene, the new plant now under construction will produce 55,000 tons of butadiene annually and about 20,000 bbl. daily of added aviation-gasoline capacity.

Gulf Coast Gasoline Stocks Continue to Go Lower

HOUSTON.—The downward trend of all grades of gasoline stocks continued during the first half of April at plants in Gulf Coast Refiners Association. They were reported at 1,364,306 bbl., a drop of 280,360. Automotive gasoline stocks were 422,576 bbl., a decrease of 183,711.

Total stocks of all products were 3,006,396 bbl., a decrease of 125,007. A year ago the total was 3,389,631. Crude runs totaled 125,275 bbl. daily.

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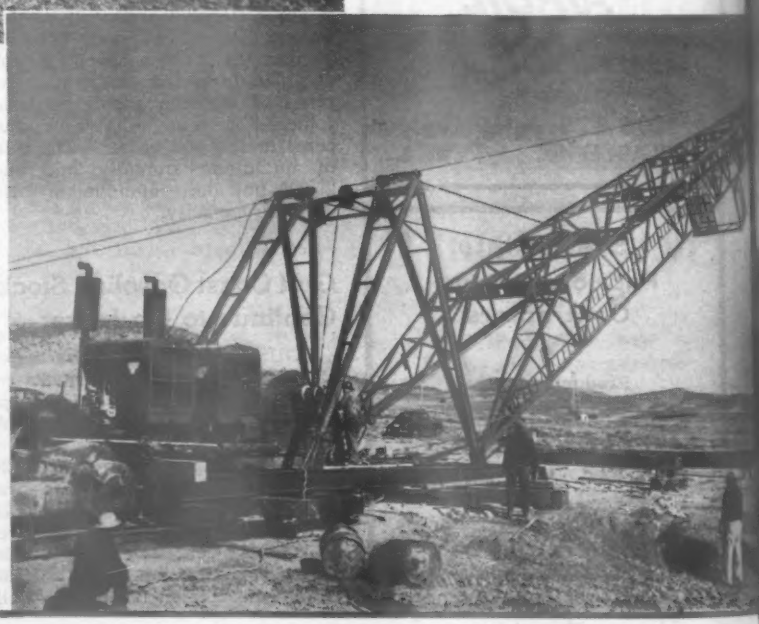
The entire assemblying of the sections that make up the mast, is done on the ground with only a minimum number of field assembly bolts to place. The traveling block is strung-up with the crown block while the mast is in the horizontal position. The traveling block and lines need not be removed when the mast is taken down for future moves. The Lee C. Moore mast can quickly be rigged-up by the drilling crew.



RAISE 2 BY THE DRAWWORKS

The patented adjustable gin pole section is a part of the mast structure. After the drilling line is strung-up in the conventional manner, the mast is raised by the traveling block and hook attached to a sling line built into the mast. The racking platform is hinged to the side of the mast and falls into position as the mast is raised.

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It only requires a couple of minutes to raise the mast from the horizontal position, and little more than that to secure the mast to the gin poles by setting four swing eye-bolts. It may take as long as five or six hours to complete the rig ready for raising.

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PIPE LINES

Utah Specifications Issued for Looping

Specifications have been issued by Utah Oil Refining Co. for laying 25 miles of 8-in. to loop the 6-in. line at the western end of the company's Fort Laramie, Wyo.-Salt Lake City, Utah, crude-oil trunk line which has been operated at 1,300-lb. pressure. The 25-mile loop is to be laid between Uintah Junction and Salt Lake City. Bids for this work will be opened May 11. The proposed loop is to provide additional capacity for the increased transportation program.

Preparations are being made for issuing specifications May 7 for the proposed 150-mile 10-in. crude-oil line from Rangely pool, Colorado, to the Wamsutter station on the company's Wyoming - Utah trunk line. The work is to be contracted after the opening of bids May 21.

Texas-Empire Prepares For Looping Program

Texas Empire Pipe Line Co. is reported to have recently released specifications for the construction of 164 miles of 12-in. loops along the main line between Sheldon, Mo., and Heyworth, Ill., which will fill in between existing loops to provide a double-line system between these points. Bids are due May 18. Between then and the starting of pipe deliveries from Youngstown Sheet & Tube Co. mills during the second week in June, it is expected that contracts will be awarded. The nine loop sections are to be bid in five jobs. The project is to be completed within 60 days from June 15.

Stanolind Takes Up 60 Miles of Loops

Work is now under way for taking up approximately 60 miles of 8-in. and 6-in. pipe along the main line of Stanolind Pipe Line Co.'s crude-oil trunk line at points between Drumright, Okla., and Sycamore, Kans. The lines being removed have not been needed since the looping of the trunk line with 16-in. pipe in 1944.

For this project Williams Brothers Corp. is removing approximately 29 miles of 6-in. and 8-in. between Drumright station and Terlton Junction. The 8-in. pipe is to be cleaned, beveled, spot welded and double-jointed at a reconditioning yard at Drumright. Sooner Construction Co. is taking up 6-in. pipe in the Nelagoney Junction - Lake Station section in Oklahoma and the Havana Junction - Sycamore Station section in Kansas.

Panhandle Eastern Loop Construction

Work on 32 miles of 24-in. for looping the Panhandle Eastern Pipe Line Co. trunk line will start between May 15 and June 15. The contractor, Midwestern Engineers, will conduct operations under the supervision of R. C. Stanley, superintendent, who is expected to make headquarters at Fort Wayne, Ind. The loops will be laid between Edgerton, Ind., and Maumee, Ohio. This contractor is replacing gate valves with higher pressure valves along the system as part of the pro-

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gram for raising operating pressures from 500 psi. to 600 psi. This firm is now engaged in installing compressors and other equipment at the Centralia, Mo., Pleasant Hill, Ill., Glenarm, Ill., Zionsville, Ind., and Montezuma, Ind., stations.

Interstate Construction to Start at Liberty, Miss.

Construction of Interstate Oil Pipe Line Co.'s 120-mile system consisting of 8-in., 10-in. and 12-in. pipe for delivering Mississippi crude oil to Baton Rouge, La., is to start near Liberty, Miss., on the arrival of the 12-in. pipe now in transit by river barge from Republic Steel Co. mills. Sharman & Allen, the contractor, is now engaged in clearing the right-of-way.

Sinclair Replaces River Crossing Lines

Sinclair Refining Co., pipe line division, is replacing four 8-in. crude oil lines at a river crossing of the Missouri River near Brunswick, Mo. The job has been contracted by Anderson Brothers Construction Co. and is directed by Manuel Gier, superintendent.

Because of unfavorable ground conditions, it is necessary for pipe to be laid by O. C. Whitaker Co. on the surface of the ground in the building of Sinclair's Sand Draw-Crooks Gap, Wyo., line which has been in progress in recent weeks.

Financial Plans for T.G.&T. Are Approved

Stockholders of Tennessee Gas and Transmission Co., of which 81 per cent of the common stock is owned by Chicago Corp., approved the recently announced $65,000,000 refinancing plan of Tennessee at a special meeting yesterday. If plans are completed, Chicago Corp.'s total investment in Tennessee will amount to $6,701,472, according to Richard Wagner, president. Notes and preferred stock of Tennessee held by the corporation will be retired.

The $44,000,000 note of Tennessee held by the Reconstruction Finance Corp. has been sold recently to a group headed by the Chase National Bank of New York, and including the First National Bank of Chicago, the Harris Trust and Savings Bank, Metropolitan Life Insurance Co., and Equitable Life Insurance Co. The note was taken by the group at 102½. Tennessee has been granted a 6 months' option to take over the note at any time on 3 days' notice at 102½ plus interest.

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Pipeline Cleaners Co.
Fort Madison, Iowa

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Keeps Diesel Engines Running Efficiently

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At Pressures Up To 10,000 p.s.i.

To keep diesel engines operating at peak efficiency, this portable, precision-built Adeco Nozzle Tester is indispensable.

Light in weight yet built for heavy-duty service, it enables any mechanic to make quick, accurate tests on injector opening pressure, spray pattern, etc., and detect stuck needle valves and leakage around valve seats. Tests both large and small injectors, on bench or engine, at pressures up to 10,000 p.s.i. Prevents costly delays and possible damage to engine.

Ideal for testing hydraulic devices.

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This new VU 280 is built to sustain Climax Engine records of years of trouble-free service—as much as 24,000 hours with no major overhaul.

For complete operation and specification bulletin, write Climax Engineering Company, Clinton, Iowa.

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*AIR START now available, belt connected or built-in, according to engine size, on all Climax Blue Streak Engines. Choice of air start or gasoline starting optional.

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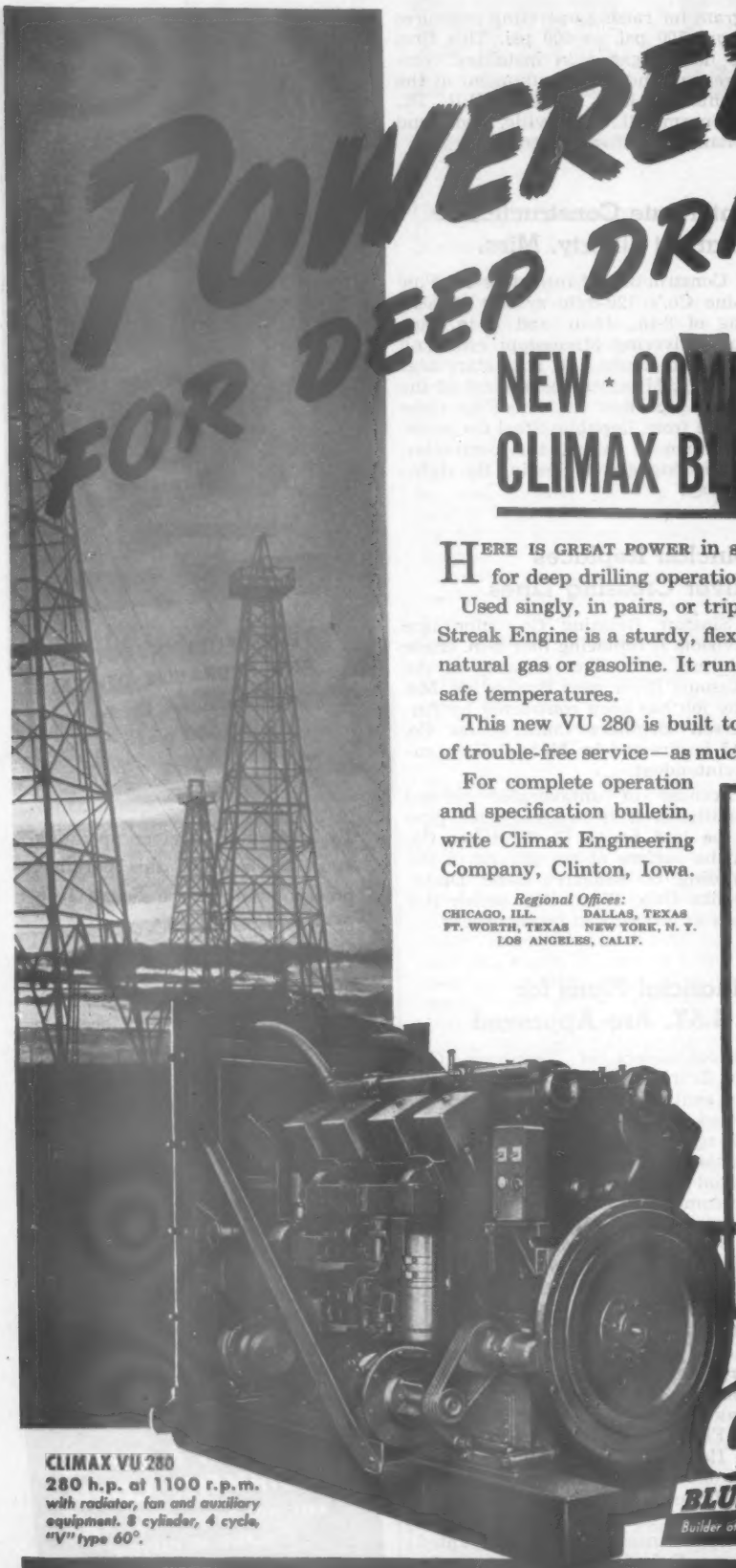
AT NO EXTRA COST!

1. **Hi-Power Blue Streak Combustion and Dual Carburetion.** Increased power and lower fuel consumption throughout the speed range.
2. **Twin Ignition.** Two independent ignition systems assure continuous operation.
3. **Cylinders Cast in Pairs** with removable wet liners.
4. **Instant Accessibility** for operating adjustments and servicing.



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280 h.p. at 1100 r.p.m.
with radiator, fan and auxiliary equipment. 8 cylinder, 4 cycle, "V" type 60°.

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BLUE STREAK ENGINE
Builder of Climax DIESELS and GENERATING SETS
CLIMAX ENGINEERING COMPANY

Exploration and Drilling

Week's Highlights

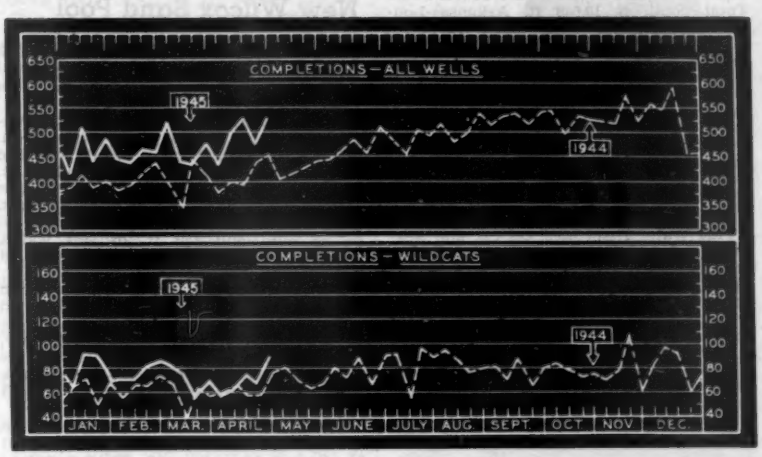
SUCCESSFUL completion of a wildcat in northwest Alabama as a small gas well is arousing some interest among geologists. The well, Glenn D. Rose 1 Bozhell, NW NE 18-12s-3w, is located approximately 50 miles northwest of Birmingham, along the south line of Winston County. It is estimated good for 750,000 cu. ft. open flow through 2½-in. tubing. Total depth is 2,005 ft., elevation 709 ft., 6⅝ in. casing set at 1,069 ft., closed in tubing pressure 410 lb.

This development has no relation to the Coastal Plain play of Mississippi, Alabama, and Florida, as the well is located in the area where the Paleozoic sediments off the Appalachian mountains are at or near the surface. From the map it appears to be near the edge of the Warrior Coal basin, and near the contact between the Upper and Lower Pottsville of the basal Pennsylvanian.

Sample tops reported are Bangor lime 1,059 ft., Hartselle sandstone 1,467 ft., Gasper 1,555 ft., and Tuscumbia lime 1,763 ft. Gas shows were reported at 1,377-97 ft., 1,760-65 ft., and 1,860-70 ft., and the entire section was acidized with 3,000 gal.

The Bangor, Hartselle, and Gasper are Upper Mississippian formations, probably Chester in age, while the Tuscumbia is lower Mississippian, probably Iowa in age. In terms more familiar to oil men in southern Illinois and western Kentucky, the Gasper and Tuscumbia would include the equivalents of the section from the Bethel sandstone, through the Aux Vases, St. Genevieve, and down to about St. Louis, or Warsaw lime.

Farther northwest in Alabama, where these Mississippian limestones outcrop at the surface, there are frequent indications of oil seeps. While the gas well discovery hardly justifies any excitement in itself, it does give encouragement to those geologists who have long considered this general area as having oil possibilities. The regional geology indicates that the Mississippian limestones offer possibilities somewhat similar to those in western Kentucky, where numerous small fields of comparatively shallow depth have been found in this geological section.



Solid line charts current weekly completions, service wells in Eastern area included

COMPLETIONS IN ALL FIELDS . . .

Week ended April 28, 1945

	Oil	Gas	Dry	Total	Footage	Total Comp. to date 1945	1944
New York	15	0	*15	30	38,415	383	302
Pennsylvania	38	5	†40	83	115,120	1,161	604
West Virginia	2	18	3	23	51,375	244	152
Ohio	2	4	8	14	34,468	244	295
Indiana	2	0	2	4	7,285	51	76
Kentucky	3	2	2	7	18,480	110	201
Illinois	13	0	16	29	81,196	487	509
Michigan	8	2	5	15	40,959	229	171
Kansas	11	1	6	18	60,045	481	552
Nebraska, Missouri, Iowa	0	0	0	0	0	12	13
Oklahoma	20	2	16	38	165,059	739	493
Texas:	81	20	58	159	634,421	2,297	1,603
North Central	28	4	24	56	129,056	660	464
West	24	1	19	44	200,016	602	485
Panhandle	7	7	0	14	45,014	191	53
Eastern	2	6	3	11	65,929	101	98
Gulf Coast	14	2	7	23	151,399	529	256
Southwest	6	0	5	11	43,007	214	247
Louisiana:	9	0	10	19	153,493	308	220
Northern	0	0	5	5	23,374	98	84
Southern	9	0	5	14	130,119	210	136
Arkansas	1	0	0	1	8,297	47	67
Mississippi	1	0	3	4	26,245	105	35
Southeastern States	0	1	0	1	2,005	11	11
Montana	13	0	2	15	30,771	95	75
Wyoming	2	0	2	4	13,717	68	45
Colorado-Utah	0	0	0	0	0	11	10
New Mexico	7	1	4	12	41,489	184	125
California	43	0	8	51	175,993	754	617
Total United States	271	56	200	527	1,698,843	8,001	6,176
Total previous week	254	43	173	470			
Total April 29, 1944	223	47	140	410			

Service wells included: *15, †37.

EASTERN TEXAS

Travis Peak Show Being Tested Near Chandler

DALLAS.—The Texas Co. 1 G. M. Morse, Santiago Caldron Survey, wildcat 1 mile south of Chandler, Henderson County, was preparing to perforate around 10,280 ft. to test shows in the Travis Peak. Total depth is 10,643 ft. Arkansas-Louisiana Gas Co. 1 Baker, Steele Survey, 4 miles northeast of Elysian Fields in southeastern Harrison County, made good gas and distillate blow for 40 minutes at 6,120 ft. in Travis Peak sand before being shut in. Humble Oil & Refining Co. 1 Pickering Lumber Co., Francois Survey, deep wildcat in the Huxley area of eastern Shelby was setting 5½-in. casing at 8,689 ft. The well blew out at this depth three weeks ago as a gas well, and circulation has not been restored.

Tide Water Associated Oil Co. and Seaboard Oil Corp. have staked a 1-mile outpost to the New Hope pool in Franklin County. It is 1 Evers, and is 440 ft. from the south line and midway between the east and west lines of a 48.37-acre tract in the I. Barre Survey. J. C. Benedum 1 Pickering Lumber is a new Travis Peak wildcat for Shelby County, 6 miles east of Patroon. It is 2,000 ft. from the east line and 500 ft. from the south line of tract in the W. J. Brittian Survey.

Ohio Oil Co. 1 Popper, Roberts Survey, 2½ miles southeast of Cash, Hunt County, is dry at 9,391 ft. after cores from 9,185-9,215 ft. recovered sulfur water. Smackover was topped at 9,190 ft. It was waiting on orders after running electrical survey.

EASTERN TEXAS WILDCAT FAILURES

Camp County: M. E. Davis et al 1 Mrs. C. A. Shelby, Thomas Williams Sur., 1 mi. NE Newsome, elev. 488 ft., Paluxy 5,850 ft., Glenrose 6,223 ft., massive anhydrite 7,330-7,500 ft., Pittsburgh 8,154 ft., dry, TD 8,264 ft.

Robertson County: Armstrong & Richardson 1-A E. G. March, Hugh Henry Survey, 6 mi. S Franklin, elev. 457 ft., dry in Wilcox, TD 976 ft.

J. A. Arhopulos 1-A D. C. Bolton, H. Viesca Sur., 6 mi. SE Franklin, elev. 476 ft., dry, TD 1,254 ft.

SOUTHWEST TEXAS

Goliad Test May Open New Wilcox Sand Pool

CORPUS CHRISTI.—Hewit & Dougherty 1 T. W. Wolfe, wildcat 10 miles west of Pettus in Bee County, topped the Slick sand at 6,635 ft., Luling sand at 6,749 ft., and Massive at 7,009 ft. On 9-minute drill-stem test at 6,749-55 ft., using ¼-in. chokes, the results were: 495-lb. working pressure, 10 ft. of condensate and 60 ft. of salty muddy water. Another drill-stem test at 6,756-60 ft., using ¼-in. chokes, no pressure, slight blow, recovered 150 ft. of mud and 150 ft. of salt water. Operators are now preparing to core at 7,270 ft.

Transwestern Oil Co. 1 Wm. Altman estate, wildcat 15 miles north of Goliad and 2 miles south of Slick field, in the B. P. Tumlinson Survey, Goliad County, topped a gas sand at 7,516 ft., and operators are coring at 7,523 ft., still in the sand. If this proves to be productive it will open a new Wilcox sand field.

Sun Oil Co. 2-D M. M. Garcia, Garcia field, Starr County, in Tract 12, Porcion 94, flowed 78.52 bbl. on 24-hour potential test through ⅛-in. choke, no water, casing pressure 600 lb., gravity 44.6°, gas-oil radio 451 to 1, from 30 perforations at 3,878-83 ft., and 66.90 bbl. through ⅛-in. choke, no water, gravity 44.6, tubing pressure 425 lb., gas-oil ratio 658 to 1, from 24 perforations 4,106-10 ft. Total depth is 4,281 ft., with 5½-in. casing at 4,151 ft.

The South Texas Geological Society has announced the following new field names: Karnes County—The name "Coy City" has been given the field discovered by Seaboard Oil Co. 1 Sally Treadwell, H. W. Brown Survey, Abst. 32. San Patricio County—The name "Maedgen" has been given the field discovered by H. H. Howell 1 C. A. Maedgen, Delgado Grant Abst. 4, 2 miles southwest of Mathis.

SOUTHWEST TEXAS SUCCESSFUL WILDCATS

Wilson County: Oil discovery—L. D. Ormsby 1 Williamson heirs, M. Contis Sur., 9 miles northeast of Floresville, top sand 5,042 ft., total depth 5,062 ft., PF 127 bbl. a day, pumping, gravity 18.3°, 10 per cent water.

SOUTHWEST TEXAS WILDCAT FAILURES

Jim Wells County: Dee Davenport 1 O. T. Burns, J. Almond Sur. 8, 3 miles southwest of Alfred, dry at 5,012 ft.

Karnes County: S. H. Howell 1 K. L. Handy, Carlos Martinez Sur., 3 miles west of Runge, dry at 7,500 ft.

Zapata County: George H. Echols 1 T. Dominguez, Porcion 31, Share "A", 9 miles northeast of Zapata, dry at 3,310 ft.

TEXAS GULF COAST

Rock Island Discovery Produces Gas, Condensate

HOUSTON.—Sinclair Prairie Oil Co. 1 Fehrenkamp, Rock Island field discovery well, in SA&MG Survey, Section 23, about 5 miles northeast of Rock Island in Colorado County, is completed as a gas-condensate producer with an initial production of 6,000,000 cu. ft. of gas a day open flow, with an ungaged amount of distillate. On a 3/16-in. choke it flowed at the rate of 2,160,000 cu. ft. gas a day, with tubing pressure of 2,525 lb. Total depth is 11,000 ft., with 5½-in. casing set on bottom. After a series of tests at various levels in the hole completion was made in perforations at 9,678-95 ft.

Sun Oil Co. 1 E. H. Moore estate, wildcat in F. W. Plummer Survey, Abstract 583, Double Gum Bayou area, 6½ miles northwest of Winnie in Chambers County, is testing in perforations at 8,880-90 ft. through ⅛-in. choke, flowing 30 per cent oil along with wash water and some salt water. Pressures were 1,700 lb. on tubing and 650 lb. on casing. Total depth is 9,750 ft.

Navarro Oil Co. 2 Foster Lumber Co., George Taylor Survey, second producer for the Cold Spring area of San Jacinto County, shows a daily flow of 38.04 bbl. of 34-gravity oil through 7/64-in. choke with 1,600-lb. pressure on tubing and 2,160-lb. pressure on casing, gas-oil ratio 4,250 to 1. Top of sand was 7,861 ft., and total depth is 7,865 ft.

In the Alief pool of Harris County, Cities Service Oil Co. 1 F. R. Lummis, George Bellows Survey, opened a new sand and extended production limits with initial of 100.08 bbl. of 51.8-gravity oil along with 5.9 per cent water through ⅜-in. choke, tubing pressure 1,798 lb., casing sealed. Gas-oil ratio 46,100 to 1. Total depth is 8,500 ft. with 45 perforations at 8,315-26 ft.

Tide Water Associated Oil Co. 1 W. F. Albert, northeast offset to discovery well of the Sublime field in Colorado County, flowed at the rate of 148 bbl. a day on drill-stem test in open hole at 9,530-35 ft. Hole was deepened to 9,450 ft. and drill-stem test was made in open hole from 9,530-40 ft. where it again flowed oil but showed a little water at end of test. Total depth is 9,540 ft. with 7-in. casing set at 9,530 ft. Tool has been pulled and tubing is being run for a production test.

UPPER GULF COAST WILDCAT FAILURES

Chambers County: Sun Oil Co. 1 A. V. Wolfean et al, Double Bayou area, R. O. W. McManus Sur., 3½ miles south of Anahuac, dry at 9,225 ft.

DAILY AVERAGE PRODUCTION FOR WEEK

	Apr. 28 crude oil	Distillate, allied products	May PAW quota all oils	Apr. 21 crude oil
Alabama	500	.....	300	300
Arkansas	79,800	5,200	85,200	79,900
California	918,750	60,280	1,007,280	915,350
Colorado	10,050	.....	10,500	9,850
Eastern	65,650	6,600	73,800	65,650
Illinois	200,300	12,000	217,000	205,600
Indiana	11,700	.....	13,000	11,600
Kansas	264,600	4,200	278,200	273,150
Kentucky	27,900	2,200	33,200	25,500
Louisiana	366,300	42,000	402,000	366,050
North Louisiana	71,300	.....	.....	71,050
South Louisiana	295,000	.....	.....	295,000
Michigan	48,000	700	47,700	43,300
Mississippi	52,400	.....	53,000	52,400
Montana	23,100	300	23,300	22,650
Nebraska	900	.....	1,000	900
New Mexico	104,550	4,800	109,800	104,500
Oklahoma	363,550	28,500	396,000	347,350
Texas	2,170,550	162,000	2,332,000	2,170,550
East Texas	378,100	.....	.....	378,100
East Central Texas	145,550	.....	.....	145,550
North Central Texas	150,000	.....	.....	150,000
Texas Panhandle	90,000	.....	.....	90,000
West Texas	489,500	.....	.....	489,500
Southwest Texas	352,150	.....	.....	352,150
Texas Gulf Coast	565,250	.....	.....	565,250
Wyoming	103,400	3,200	115,200	99,150
Total United States	4,812,000	331,980	5,198,480	4,793,750
Change from previous week	up 18,250			

Total production January 1-April 28, 1945 ..... 561,566,300 bbl.
Same period last year ..... 523,762,961 bbl.

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Your Best Insurance to PREVENT Disaster

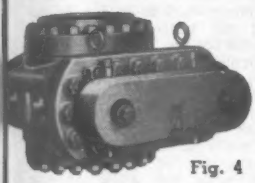

Fig. 4

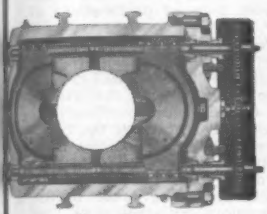

Fig. 5

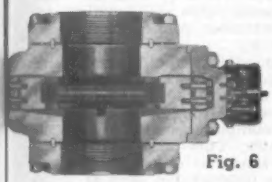

Fig. 6

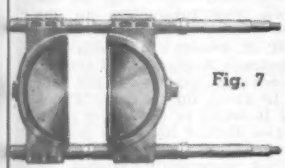

Fig. 7

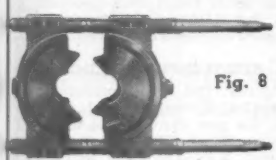

Fig. 8

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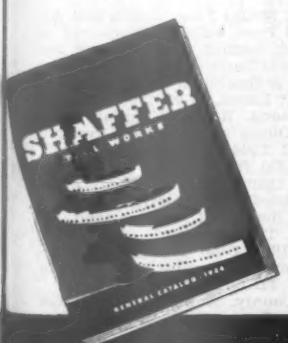

Another popular hook-up is pictured in Fig. 3 where two Shaffer SINGLE Cellar Control Gates are used; and Fig. 11 shows how many operators employ three SINGLE Gates on deep, high-pressure wells.

EVERY DETAIL REVEALS SAFETY

The bodies of Shaffer Cellar Control Gates (Fig. 4) are cast from special alloy steel, rigidly inspected, and all parts, as well as the complete assembly, are progressively tested. The large diameter stainless steel operating screws (Fig. 5) close the rams quickly and evenly. The ram rubbers seal off around the pipe when equipped as in Fig. 8; or effect a complete shut-off when rubbers as in Fig. 7 are used. The angular guides which center small diameter pipe are shown in Fig. 9; and the strong, wear-resistant rubbers are pictured in Fig. 10.

ENGINE CLOSES GATES QUICKLY

The Shaffer Gate Closing Engine (Fig. 12) is the modern way to close Shaffer Cellar Control Gates at the first indication of an impending blow-out. Located at any desired distance from the derrick, this Engine closes, or opens, one or more Gates by merely opening a valve, as pictured. In actual field tests a 13⅜" Shaffer Cellar Control Gate was closed in 8 seconds with this efficient mechanism. Owners of all types of Shaffer Gates will be interested to know that they can be readily equipped to operate by means of this Engine, which is also adaptable for operating any type of gate valve, master valve, or similar equipment.

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In the interest of safety and efficiency of operations, we invite operators having special and difficult problems to confer with us to secure definite, helpful recommendations from our technical staff. There is no cost or obligation incurred in learning how you can protect *every* well against high pressures. Write today.

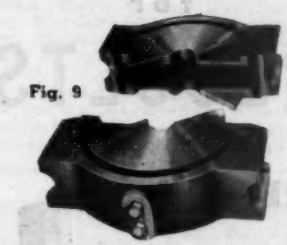

Fig. 9

Fig. 10

Fig. 11—Many operators use more than two Shaffer Cellar Control Gates in their hook-ups.

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with the

REGULAR

THREE-IN-ONE PACKER

You can be sure of outstanding results with this packer for—

- Shutting in gas wells.
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- Repressuring oil sands.
- Acidizing lime wells.

The Three-In-One Packer is designed to set and pack in the open hole.

Thick heavy rubber and a step expanding cone makes it possible to pack oversized holes or wells having irregular side walls.

It is assembled with sufficient cotter keys to hold the step expanding cone in position during transit and while lowering into the well.

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TULSA, OKLAHOMA

Factory: Coffeyville, Kansas

ews Pickens Sur. A-341, 2 mi. S Archer City, dry, TD 1,255 ft.

A. P. Kouri 1 Abercrombie & Taylor, Blk. 12, J. W. Harris, subd., 9 mi. W and 3 mi. S Archer City, elev. 1,098 ft., dry, TD 1,405 ft.

Republic Natural Gas 1 Dean M. Powell, Sec. 1, Wm. Henry subd., 1 mi. E Archer City, dry, TD 1,377 ft.

Staley Oil 1 W. Duckworth, Harris Club Ranch, 13 mi. NW Archer City, elev. 1,096 ft., dry, TD 1,450 ft.

Cooke County: NuEnamel 1 E. G. Ramsey, T. J. Hutchinson Sur. A-1677, 7 mi. NW Muenster, elev. 1,050 ft., Ellenburger 2,250 ft., dry, TD 2,385 ft.

Cottle County: S. D. Johnson 1 J. E. Moss, Sec. 5, A. Forsythe Sur. A-658 ft., 4 mi. S and 9 mi. E Paducah, dry, TD 5,576 ft.

Throckmorton County: Bridwell Oil 2 Joe Cook, J. D. Hardin Sur., A-209, 4½ mi. N Ft. Griffin, dry, TD 850 ft.

Wichita County: S. F. Hutcheson 1 John Paul Cody, Blk. 320, Waggoner Colony subd., 4 mi. NE Electra, dry, TD 1,960 ft.

WEST CENTRAL TEXAS WILDCAT FAILURES

Brown County: Vic M. Gamblin et al 1 R. W. Smith, Sec. 73, HT&B Sur., 3 mi. SW May, dry, TD 1,165 ft.

Callahan County: O. B. Perot 1 Ben Holstead, Sec. 121, BBB&C Sur., ½ mi. SE Baird, elev. 1,733 ft., dry, TD 1,102 ft.

Harold G. Neely 1 J. W. Brown, Sec. 1, S&P Sur., 5½ mi. SW Baird, elev. 1,853 ft., dry, TD 1,256 ft.

Coleman County: Gilmore Oil 1 C. L. Joyce et al, Jas. Greenwood Sur. No. 304, 4½ mi. NE Talpa, dry in Caddo, TD 3,655 ft.

Hamilton County: C. & I. Prod. Co. 1 C. E. Lund, B. A. Carter Sur., 10 mi. NW Hamilton, elev. 1,307 ft., dry, TD 3,468 ft.

MICHIGAN

Two Large Wells Sustain Deep River Interest

SAGINAW.—Two 200-bbl.-an-hour wells in Arenac County's Deep River pool headlined field developments. Fifteen tests were completed including eight new oil producers, two gas wells and five dry holes, of which three were wildcat failures. A third Deep River completion was a dry hole in the same section as one the gushers. Isabella County's Coldwater field maintained its one-a-week record of producers without failures. The field's newest well was good for nearly 2,000 bbl. daily. Total initial potential of the eight wells exceeded 12,000 bbl. a day, best record of the year.

One of the gas wells, in Colfax Township, Mecosta County, focused attention on that area as a new major natural-gas area.

Another spurt in drilling operations developed. The state conservation department issued 20 new permits, six for Arenac County, three for Mecosta, one each for Sanilac, Bay, Van Buren, Saginaw, Montcalm and Ottawa, and five for Allegan.

MICHIGAN WILDCAT FAILURES

Allegan County, Door Township: Del Fortney 1 Gay and Anna Hales, NE SE SE 15-4n-12w, dry in Traverse limestone, TD 1,717 ft.

Midland County, Hope Township: Rowmor Corp. 1 Joynt, NE NE NE 36-16n-1e, dry in Monroe, TD 4,059 ft.

Missaukee County, Riverside Township: Turner Petroleum Corp. 1 Richard Meyering, C N½ NE SE 19-21n-7w, dry in Dundee, TD 3,975 ft.

CALIFORNIA

Kern County's Race Track Pool Extended ½ Mile

LOS ANGELES.—Extension of the Race Track field in Kern County by Kern Oil Co. which completed 28-34 fee in 34-29s-29e flowing 800 bbl. of clean 48.5-gravity oil and 500,000 cu. ft. of gas daily, featured California activity this week. This completion extended the productive limits of the field about ½ mile north. Kern Oil Co.'s completion is 100 ft. higher structurally than British-American Oil Producing Co. wells to the south, indicating the probability of a northwest-southeast trend with the apex of the structure west of Kern's new well. Completion was from 5 ft. of perforations at 4,687-92 ft.

The Texas Co.'s recent discovery, northwest of the Del Valle field in Los Angeles County, flowing 196 bbl. of 29.3-gravity oil daily, reflects the growing importance of the Santa Clara River synclinorium. This region, generally known as the Newhall-Castaic area, birthplace of the California oil industry and looked upon as favorable for many years, continues to be one of the most promising areas in the state from an exploratory standpoint. The district is characterized by Miocene sediments and considerable deformation resulting from extreme faulting and fracturing.

There is a possibility the Western Gulf Oil Co. has found the Paloma zone in 67-2 L.A.A.C. an outpost in the extreme northeastern end of the Paloma pool. At 12,350 ft. the company cored a black oil sand 30 ft. thick. This outpost has penetrated three sands to date, the Symons at 11,840 ft., an unidentified sand at 12,025 ft. and the new sand which may be the normal Paloma pay productive to the west.

E. W. and H. R. Pauley's northern outpost in the Coalinga Nose field, 18-18s-16e, which was recently completed but not tested failed to come up to expectations when opened. It failed to show any pressures, oil or gas. Tubing has been pulled. It showed for production earlier on a formation test but apparently sanded up standing shut in while tanks were erected. It will extend the field several locations if completed as a commercial producer.

CALIFORNIA SUCCESSFUL WILDCAT

Los Angeles County, Del Valle extension: Texas 42-4n-17w, flowed 196 bbl. 29.3-gravity oil, 0.4 per cent cut, 4/64-in. bean, pressure 200/0, TD 3,114 ft., PB 3,010 ft., perf. 2,817-3,010 ft., located 1 mile northwest of nearest production at Del Valle.

CALIFORNIA WILDCAT FAILURES

Fresno County, Jacalitos: Jacalitos Oil Co. 1 Plaugher, 30-21s-16e, bottomed in Etchegoin gray sand, no showings, TD 4,469 ft.

Kern County, Mount Poso: Travis and Associates 3 Poso, 8-27s-28e, bottomed in gray sand, Vedder sand Miocene age 2,212 ft. was barren, TD 2,287 ft.

Poso West: Independent Exploration Co. 1 Lambert Lands, 35-28s-27e, bottomed in gray sand, Round Mountain sand 1,710 ft., Olcese sand 1,912 ft., Pyramid Hills sand 2,948 ft. Vedder sand 3,021 ft., TD 3,210 ft.

Los Angeles County, Coyote West: Pike-Bolsa Chica-British-American 1 Stern, 14-3s-11w, bottomed in gray sand, no showings, TD 5,598 ft.

San Jose Hills: Ohio 1 Legrand, 30-1s-9w, bottomed in granite basement, no showings, TD 6,141 ft.

Sacramento County, Walnut Grove: Texas 1 Walnut Grove Unit, 35-5n-4e, bottomed in gray sand, Base Tehama 2,974 ft., Capay shale 3,622-3,873 ft., no showings, TD 4,482 ft.

SOUTH LOUISIANA

New Pool, Three New Rigs Feature Week's Activity

NEW ORLEANS. — Union Sulphur Co. has opened a new pool in the South Bayou Mallet area of Acadia Parish with completion of 1 Marvine Kahn, 25-7s-1e. On 24-hour potential gage the well flowed 146 bbl. of fluid, 10 per cent salt water, with 1,300-lb. pressure on tubing, through 7/64-in. choke. Gas-oil ratio was 1,881 to 1 and gravity 36.8°. Total depth is 9,798 ft. with perforations at 9,610-14 ft.

Tide Water Associated Oil Co. opened a new sand for the Venice field of Plaquemines Parish at 1-C Manhattan Land & Fruit Co., 23-21s-30e. Total depth is 12,431 ft. in shale with 5½-in. casing set at 12,424 ft. Pipe is perforated at 11,867-98 ft. and the well is on production test, flowing 10.39 bbl. an hour through 5/31-in. choke, tubing pressure 1,250 lb., gas-oil ratio 740 to 1, gravity 35°.

Humble Oil & Refining Co. is opening a new deep sand for the Avery Island field of Iberia Parish at the 4-B Petit Anse Co., 23-13s-5e. Total depth is 11,405 ft., with 5½-in. casing set at 11,289 ft., perforated at 11,208-216 ft. The well flowed at the rate of 44 bbl. a day of 44.6-gravity oil with 1,217,000 cu. ft. gas, tubing pressure 2,400 lb., gas-oil ratio 27,425 to 1, on a drill-stem test using 3/16-in. bottom and ⅛-in. top chokes, open 14 hours. Operators are preparing to squeeze perforations.

Humble 1 Mrs. Sallie R. Smith, 16-7s-1w, is a new condensate producer for the North Tepetate field of Acadia Parish. Total depth is 9,085 ft. and perforations are 9,005-40 ft. Potential production is 108 bbl. a day through 5/32-in. choke with gas-oil ratio of 19,305 to 1, tubing pressure 4,475 lb., gravity 53.2°. The 7-in. casing is set at 9,080 ft., 2½-in. tubing at 8,930 ft., and packer at 8,921 ft.

SOUTH LOUISIANA WILDCAT FAILURE

St. Mary Parish: Hunt Oil Co. 1 St. Mary Bank & Trust Co., 8-15s-12e, junked and abandoned at 12,470 ft.

CANADIAN FIELDS

Turner Valley Extension Area Being Developed

CHATHAM.—In the north central Turner Valley area, Royalite Oil Co. is continuing systematic development following the completion of several unexpectedly large producers. The area, west of the gas-cap section of the original central field, was for many years regarded as unpromising until a couple of wells drilled last summer hit good production. Recently, Royalite 77, LSD 1, 2-20-3w5, completed for 463 bbl. of 40° crude from the Madison at 6,987-7,428 ft. and Royalite 78, LSD 2, 2-20-3w5, with Madison at 8,270-8,744 ft. flowed 912 bbl. Royalite 81, LSD 8, 2-20-3w5, offsetting 77 to the north, had Madison contact at 6,897 ft. and Royalite 82 has been spotted to the east, nearer the gas cap, in LSD 4, 1-20-3w5.

Conrad.—In the Conrad field, southern Alberta, Mid-Continent-East Crest 1, LSD 2, 8-6-15w4, finished at 3,158 ft. with production in the Ellis is officially rated 208 bbl. initial production. Mid-Continent-East Crest 2, LSD 8-6-15w4, bottomed at 3,191 ft., collapsed 50 ft. of 7-in. casing in shooting a tight section of the Ellis, and is fishing for pipe.

Tempest.—In the Tempest area, southern Alberta, Imperial Oil, Ltd. 1 Tempest, LSD 4, 27-9-19w4, has been abandoned after testing Devonian limestone at 5,112 ft. with noncommercial showings. Imperial-Tempest 2, LSD 3, 24-9-19w4, is spudding southeast of No. 1.

APPALACHIAN FIELD

West Virginia Gas Development Spreads

PITTSBURGH.—In the new development in southern West Virginia, United Producing Co. completed a good gas well in the Center district, Wyoming County, at 1,189 W. M. Ritter Lumber Co., which had natural open flow of 1,000,000 cu. ft. of gas, and 2,970,000 cu. ft. after being acidized. The Maxton sand was placed at 2,170 ft., Big lime 2,419 ft., rock pressure 560 lb. 48 hours, total depth 2,853 ft. In the Oceana district, Wyoming County, Hope Natural Gas Co. completed 8,911 Loup Creek Colliery Co. with a final gage of 1,443,000 cu. ft. gas with the Princeton sand at 1,692-1,722 ft., gas 1,707-18 ft., Ravencliff sand 1,788-1,827 ft., gas 1,806-27 ft., shot 1,806-26 ft., total depth 1,870 ft.

In the recent extension in Flemington district, Taylor County, Pittsburgh and West Virginia Gas Co. completed 6,153 E. G. Taylor in the Injun sand good for 493,000 cu. ft. of gas from total depth of 1,367 ft.

In southwest Pennsylvania, Peoples Natural Gas Co. abandoned the deep test on Camilla Giffin farm in Derry Township, Westmoreland County. It was bottomed

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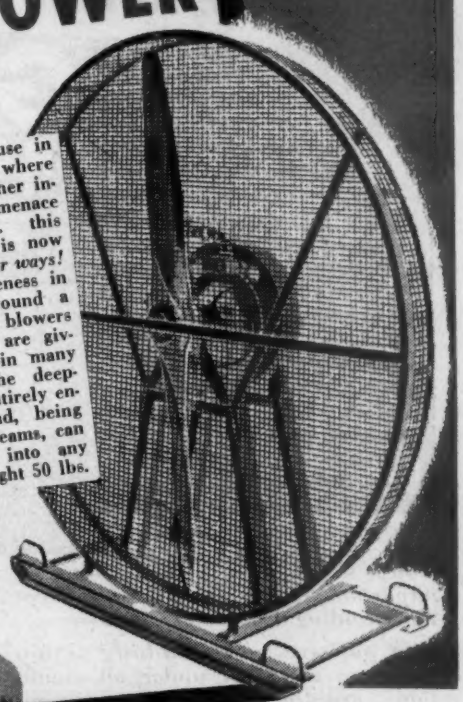

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at 7,467 ft. without evidence of the Tully lime.

ILLINOIS

High Average Initial Output Marks Week's Completions

CENTRALIA.—Thirteen oil wells and 16 dry holes were reported completed in the past week in Illinois. The new oil wells averaged 235 bbl. per day initially, the high average having been made possible by the unusually large production of four wells that averaged 591 bbl. per well in first-day output.

Gulf Refining Co. 1 Green, SW SW SW 23-1s-3e, in the Boyd pool, Jefferson County, produced 1,201 bbl. on its 24-hour completion test. Pay is McClosky lime at 2,732-42 ft. Texas Co. 1 Scherer, SW SE NE 23-4n-10e, Olney East pool, Richland County, had McClosky lime at 3,071-79 ft., and pumped 415 bbl. in 24 hours following acid treatment. Texas Co. 1 W. Jones community, SW SE NW 9-1s-6e, Sims North pool, Wayne County, started at 508 bbl. per day from McClosky lime at 3,168-82 ft., acidized. Pure Oil Co. 2 Dwyer, SW NE NE 12-1n-7e, Clay City, Wayne County, was good for 285 bbl. a day from Rosiclaire lime at 2,986-3,200 ft., acidized.

Ten wildcat dry holes were reported during the week. New wildcat operations started in the past fortnight were as follows: Standard Drilling Co. 1 Grefsking, NW SW NE 19-7n-5e, and F. L. Strickland 1 Wenthe, NW SW SW 4-7n-6e, Effingham County; W. F. Long 1 Weber, SE SE NE 26-1n-9e, and Magnolia Petroleum Co. 1 P. C. Borah, SW SW SW 4-1s-9e, Wayne County; The Texas Co. 1 Dielling, NW NW SE 30-1s-3w, Washington County; The Texas Co. 1 Carson, NW SE SE 1-4s-1e, Jefferson County; National Associated Oil Co. 1 Hall, SE SW NE 9-5s-7e, Hamilton County; R. E. Johnson 1 Lynch, C NW SW 26-2n-1e, Marion County; Pekin Oil Project 1 DeSutter, NE SE NW 8-23n-6w, Tazewell County; H. R. Randall et al 1 C. C. Cyther, NW NE SW 13-5s-2e, Franklin County; Paul Doran 1 Brissenden, SE SE SW 16-3n-7e, Clay County; Robinson & Puckett 1 W. F. Moit, NE NW NW 33-1n-8e, Wayne County; W. H. Krohn 1 Haarman, SW SW SW 28-8n-5e, Effingham County.

ILLINOIS WILDCAT FAILURES

Edwards County: Perry Fulk et al 1 Vaughn, SW NW SE 12-1n-10e, dry at 3,272 ft. Tar Springs 2,450 ft., Barlow 2,800 ft., Ste. Genevieve 3,187 ft.

Franklin County: Sohio 1 Smith, SE NE SE 20-5s-3e, dry at 3,027 ft. Menard 2,063 ft., Cypress 2,558 ft., Benoist 2,727 ft., Aux Vases 2,827 ft., McClosky 2,947 ft., St. Louis 2,973 ft.

Marion County: Magnolia 1 Robinson, NW SE NW 10-2n-4e, dry at 2,811 ft. Waltersburg 1,983 ft., Cypress 2,363 ft., Benoist 2,519 ft., Aux Vases 2,590 ft., McClosky 2,688 ft. to 2,801 ft. at intervals. Produced 15 gal. of oil and 14 gal. of water on swabbing test.

Richland County: R. S. Hayes 1 F. Kurtz, NE NE NE 21-3n-10e, dry at 3,271 ft. Menard 2,297 ft., Cypress 2,771 ft., Benoist 2,921 ft., Aux Vases 3,036 ft., McClosky 3,142 ft., St. Louis 3,245 ft.

Shelby County: Phillips Petr. 1 Dove, SE SE NW 9-9n-4e, dry at 1,965 ft., Vienna 1,324 ft., Cypress 1,588 ft., Benoist 1,699 ft., Aux Vases 1,726 ft., McClosky 1,817 ft., St. Louis 1,949 ft.

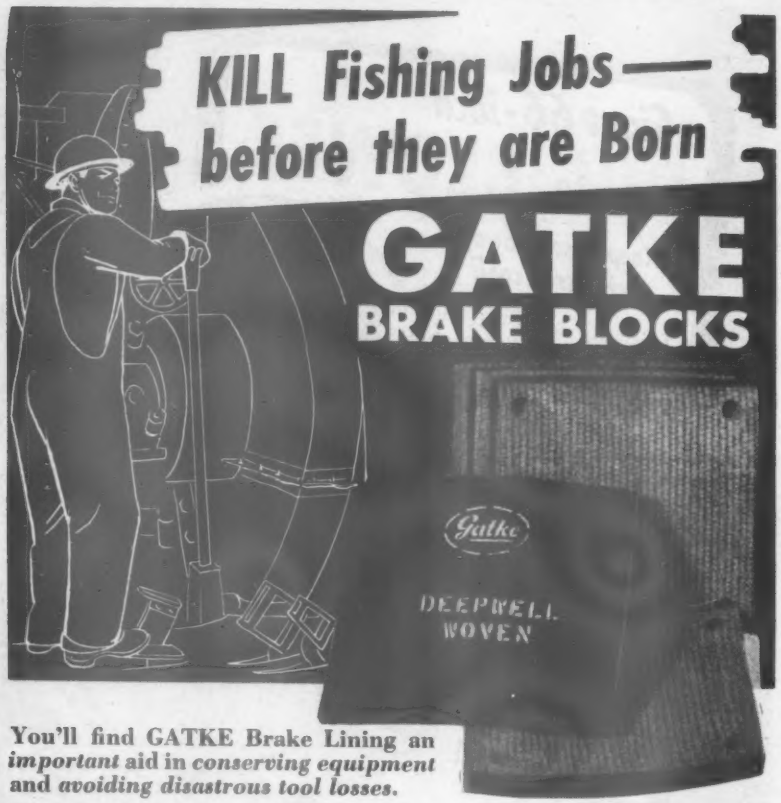
W. H. Krohn 1 Barnes, NW NE SE 31-11n-3e, dry at 1,900 ft., Lower Glen Dean 1,448 ft., Cypress 1,602 ft., Weller 1,622 ft., Benoist 1,686 ft., Aux Vases 1,750 ft., Fredonia 1,838 ft.

Clark County: L. J. Loyd 1 Boye, NW NW SE 21-11n-12w, dry at 2,432 ft. No log.

White County: Magnolia 1 A. J. Williams, SW NE SE 18-4s-9e, dry at 3,537 ft. Menard 2,541 ft., Cypress 3,132 ft., Benoist 3,202 ft., Aux Vases 3,320 ft., McClosky 3,524 ft.

Ashland 1 Shepard, NW SE NW 5-4s-10e, dry at 3,368 ft., McClosky at 3,266-70 ft., tested salt water.

H. H. Weinert 1 Milo, NW SW SW 4-5s-8e, dry at 3,572 ft. Lower Kincaid 2,260 ft., Cypress 3,018 ft., Benoist 3,209 ft., Aux Vases 3,340 ft., McClosky 3,483 ft.



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OHIO, KENTUCKY

New Clinton Gas Pool Opened in Perry County

COLUMBUS.—Ohio Fuel Co. 259 Sunday Creek Coal Co., Section 1, Monroe Township, Perry County, indicates the opening of a new Clinton gas pool. Sand at 3,963-4,018 ft. gaged 757,000 cu. ft. with pay at 3,988-3,994 ft. The well will be tested in the lime before any offsets are drilled.

Four Way Oil 3 Albert Sturgeon, Section 23, Hopewell Township, Perry County, was shot after standing for some time, and flowed 70 bbl. with 206,000 cu. ft. gas. The company has started another well ¼ mile to the northeast.

A good showing of oil was found in a wildcat drilled by the Ohio Fuel on F. W. Sprang farm, Section 5, Ripley Township, Holmes County. Clinton at 3,205-32 ft. filled up 1,500 ft. in 24 hours.

OHIO SUCCESSFUL WILDCAT

Perry County, Monroe Township: Ohio

for *Clean Cut Separation* of water from gasoline

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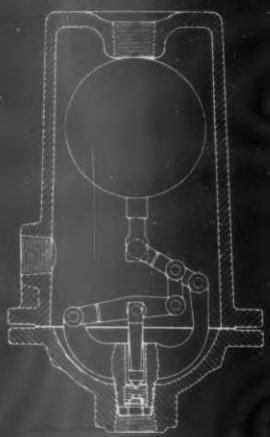

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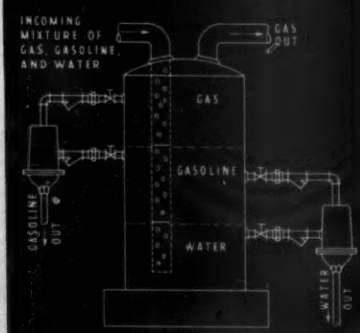

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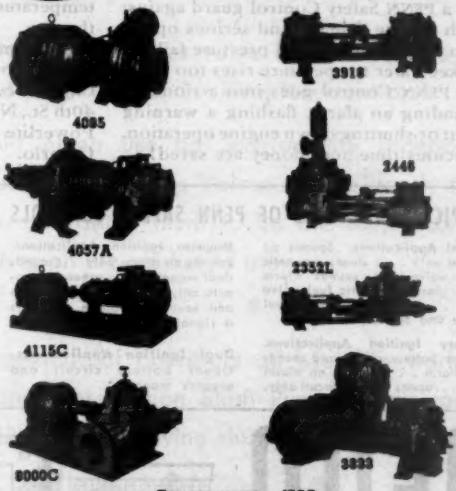

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Fuel 259 Sunday Creek Coal, Section 1, Clinton 3,963-4,018 ft., 757,000 cu. ft., TD 4,021 ft.

OHIO WILDCAT FAILURES

Muskingum County, Adams Township: Ohio Fuel 1 V. F. Vinsel, Section 14, Clinton 4,108-64 ft., dry, no Medina sand, TD 4,250 ft.

Cass Township: S. E. Large et al 1 Frank Funk, 1st Qr., Clinton 3,372-3,414, dry, TD 3,492 ft.

WESTERN KENTUCKY

OWENSBORO.—Swan & Fleming appear to have opened a pool 2 miles east of Corydon; Henderson County, with 1 Patterson, 1-O-22. A 1-hour drill-stem test of Cpress sand at 2,264-72 ft., the total depth, developed 410 ft. of clean oil and 100 ft. of out-cut mud. It is 2 miles from other production.

Carter Oil Co. completed two wells on the M. I. Drury farm, in Union County. No. 4 Drury was good for 792 bbl. initially from McClosky lime at 2,531-61 ft., total depth 2,567 ft., but No. 5 Drury, 1,250 ft. southwest of No. 3, was dry at 2,582 ft.

WESTERN KENTUCKY WILDCAT FAILURE

Daviess County: Miller & Shiarella and Ashland 1 M. D. Howard, 3-N-27, dry at 2,144 ft. through McClosky lime. Top of Chester series 1,156 ft., Glen Dean 1,573 ft., Barlow 1,795 ft.

INDIANA

EVANSVILLE.—Two routine oil wells and two dry holes, one a wildcat, were reported from Indiana fields in the past week.

A report from Kingwood Oil Co.'s Tennessee test, 1 G. E. Harrison, in Cumberland County, 6 miles southwest of Crossville, said it was drilling in St. Peter (Wilcox) sand at about 3,400 ft. with no oil or gas showing. It is a cable-tool test.

INDIANA WILDCAT FAILURE

Gibson County: Ashland 1 Columbus Smith, SW SW NW 34-3s-11w, dry at 2,588 ft. Lower Menard 1,622 ft., Hardensburg 1,890 ft., Cypress 2,102 ft., Bethel 2,204 ft., Aux Vases 2,345 ft., Ste. Genevieve 2,392 ft. Two-hour drill-stem test developed 2,300 ft. of water.

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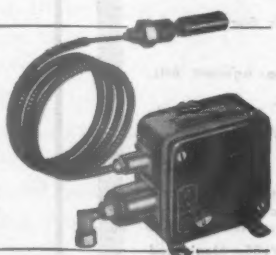
Dual Ignition Applications. Opens battery circuit and grounds magneto.



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KANSAS

New Gas Pool for Southwest Meade County

STANOLIND OIL & GAS CO. 1 Adams, SW SW SW 8-35-30w, in the extreme southwest corner of Meade County, opens a new gas pool with a rating of 35,000,000 cu. ft. of gas daily from the Mississippi lime. This well has been testing for months, and the tools were carried to 7,921 ft. in the Arbuckle, before plugging back to complete in the Mississippi. The location is about 16 miles east of the Hugoton gas field.

Russell County has a prospective pool opener in the Bennett et al 1 Prediger, SW NW SE 3-15-12w, in the southeast part of the county. A show of oil was found in the Lansing at 2,965-75 ft., and free oil showed from 3,025 ft. to 3,031 ft. Total depth is now 3,033 ft., and operators are running casing and preparing to acidize.

United Carbon Co. 1 Boisseau, SE NW 27-31-18w, a wildcat in Comanche County, is trying to exhaust water in the Mississippi, where oil and gas shows were logged. The Viola, topped at 5,475 ft., had an oil show, but was drowned out by water, and then the operators plugged back to the Mississippi. Perforations were made at 5,148-58 ft., where a good show of oil and gas was found, but increased water in hole. Water is decreasing by bailing, and operators are still testing.

KANSAS WILDCAT FAILURE

Stafford County: Virginia Drilling 1 Fischer, NE SE SE 25-21-13w, dry, TD 3,737 ft., Arbuckle 3,702 ft.

LA.-ARK.

Columbia Test Cores Lime Bleeding Oil

MAGNOLIA.—G. H. Vaughn 1 McKissick, SE SE 18-16s-21w, a wildcat in Columbia County, is coring in Smackover lime, topped at 7,626 ft. A core taken from 7,627-47 ft. recovered 1 ft. of Oolitic lime, bleeding oil and strong brackish taste. An earlier core in the Buckner, topped at 7,355 ft., recovered 8½ ft. of red shale and anhydrite. Operators are coring ahead.

In Union County, Tide Water Associated Oil Co. and Seaboard Oil Co. 1 Griffin, NW SE 33-18s-16w, found a show of oil in the cuttings at 6,760-70 ft. Tops on the well are Saratoga 2,259 ft., base chalk 2,495 ft., Cotton Valley 5,495 ft., and total depth is 7,787 ft. Operators are fishing.

In North Louisiana, operations were slow, with only 5 completions, all dry. Two of the dry holes were wildcats, one in DeSoto Parish and one in Rapides Parish.

NORTH LOUISIANA WILDCAT FAILURES

De Soto Parish: W. I. Nowlin 1 Boone, 1,650 ft. north and 330 ft. west of SE cor. of SW 25-11n-11w, dry, TD 3,509 ft.

Rapides Parish: Louisiana Land & Exploration 3-A Bentley Lumber Co., NW NE 36-5n-5w, dry, TD 7,222 ft.

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ROCKY MOUNTAIN

Half Moon Extension Gets 15 Bbl. Per Hour

DENVER.—Husky Refining Co. 2 Morrison, NW NE SW 23-51n-102w, Park County, Wyoming, is the first well completed on the Half Moon structure following a discovery last fall. It showed for 15 bbl. an hour net oil from the Embar through perforations at 3,317-3,400 ft. Like the discovery, it had water in the Tensleep. The location is ¼ mile southeast of the discovery. Husky's 1 Geiger, ½ mile south and east of 2 Morrison, which is bottomed at 1,073 ft. and fishing, is shown to be down structure by the new completion and may be abandoned.

Crook County wildcats.—M. D. Miller, of Billings, has contracted for a 3,500-ft. wildcat on Kara Terrace, 7 miles east of Moorcroft, Crook County, Wyoming, to be drilled in NE NE SE 25-49n-67w. Miller drilled in 19-49-66, 1¼ miles to the northeast in 1941 and had a dry hole in the Wall Creek at 1,240 ft. Several other wildcats are scheduled for Crook County, which is in the northeastern corner of the state, this year. A deal was made about a year ago whereby Continental Oil Co. farmed out to Williams Brothers and Victaulic Co. of America approximately 15,000 acres on the Hulett Creek, Poison Creek, Elk Horn and Tie Creek structures. Location was made for the first test on the Hulett dome in NW NW SW 15-55n-67w. It is expected these operations will begin shortly. Wyoming Reserve Drilling Co., a subsidiary of the Vitaulic company, with headquarters in Casper, will be in charge of the operation

Rangely field, Colorado.—Stanolind Oil & Gas Co. 1 Rector, NE SE 34-2n-102w, Rangely field, western Colorado, 3¼ miles southeast of the Weber sand discovery well, is a near completion and running only 122 ft. lower. It is bottomed at 6,041 ft., 417 ft. below the top of the Weber, and preparing to take another drill-stem test. A test at 5,745-5,900 ft. recovered 270 ft. of oil and gas-cut mud and 728 ft. of mud. The shut-in pressure was 1,400 lb. in 14 minutes.

The California Co. released four new locations in the Rangely field, which makes nine operations under way for that company. The Texas Co. made another location, a total of two. Stanolind has three wells at various stages; Newton Oil Co., two, and Wasatch Oil Refining Co. three, a total of 19 as compared with 12 2 weeks ago.

WYOMING SUCCESSFUL WILDCAT

Park County, Half Moon: Husky Refining 2 Morrison, NW SE SW 23-51n-102w, TD 3,563 ft. in Tensleep, 7-in. 3,539 ft., perf. Embar at 3,317-3,400 ft., acid. 500 gal., swbd. 22 bbl. of fluid per hour of which 15 bbl. per hour was pipeline oil, extension ¼ mile southeast of discovery.

WYOMING WILDCAT FAILURES

Albany County, Big Hollow: Front Range Oil & Drilling 1 Government, NW NW 20-15n-75w, TD 738 ft., top of Muddy at 717 ft., first 5 ft. slightly saturated, followed by water, dry.

Carbon County, Overland: Cherry & Kidd 1 Morris, SW SW NW 30-20n-83w, dry

(Continued on page 147)

ALL BRAKE LININGS LOOK ALIKE—BUT TRUE QUALITY IS REVEALED ONLY BY PERFORMANCE

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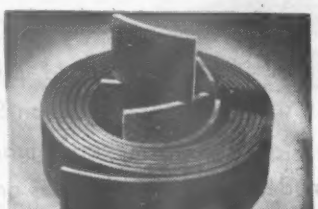

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MISSISSIPPI

Baxterville Well Trying To Squeeze Off Gas

JACKSON.—The Sun Oil Co. is trying to squeeze off gas in its 1 Snowden, NW NW NE 7-1n-16w, in the Baxterville pool. Perforations at 8,670-80 ft. tested gas with a trace of 22.3° gravity oil. The tester was pulled, and the perforations squeezed. Operators drilled out, but did not reperforate, and the well flowed 113 bbl. of 19.4° gravity oil in 13 hours, with tubing pressure of 2,550-2,800 lb. Gas-oil ratio was 4,172, and gas increased. Operators are preparing to squeeze.

The Cranfill pool has a new producer in the California Co. 3 Ratcliffe, in Section 68-7n-1w, which is flowing at the rate of 312 bbl. per day through 5/32-in. choke. Production is from the basal sand, perforations at 10,318-42 ft., and tops called on the well are Sparta 2,935 ft., Zilpha 3,800 ft., Wilcox 4,112 ft., Midway 7,700 ft., Clayton 8,546 ft., Selma 8,620 ft., first sand 9,520 ft., basal sand 10,258 ft.

In Alabama, the Gilbertown field has added another producer in the Hunt Oil Co. 1 Utsey, SE SE 34-11n-4w. No tops are given on the well, but production came after the well was drilled out to 2,583 ft., tubing was run, and the well washed with water. Operators pumped 86 bbl. of oil in 24 hours. Total depth on the hole was 2,712 ft.

MISSISSIPPI WILDCAT FAILURES

Marion County: Gulf Refining 4 Bradshaw et al, SW SE SE 21-3n-17w, dry, TD 7,200 ft. in salt.

Rankin County: George W. Lyles 1 Billings, 500 ft. and 230 ft. east of SW cor. of SE NE 11-4n-1e, dry, TD 4,818 ft.

ALABAMA SUCCESSFUL WILDCAT

Winston County: Gas discovery—Glen D. Rose 1 Bozhell, NW NE 18-12s-8w, produced 785,680 cu. ft. of gas 24-hour rate at end of 1 hour open flow, from Bangor lime and Tuscumbia at 1,377-97 ft., 1,760-65 ft., and 1,860-70 ft., TD 2,005 ft., Bangor 1,059 ft., Hartselle 1,467 ft., Gasper 1,555 ft., Tuscumbia 1,763 ft.

PERMIAN BASIN

Ellenburger Proven Productive at TXL Pool

MIDLAND.—Shell Oil Co., Inc. and The Texas Co. 1 Ratliff & Bedford, southwestern Andrews County wildcat in Section 4, Block 73, Public School Lands, encountered its third pay zone and made another drill-stem test in the Silurian. The well had already flowed oil on drill-stem tests in the Permian and in the Devonian. On the first drill-stem test of the Silurian from 9,757-82 ft. there was a good show of gas to the surface in 16 minutes and 700 ft. of 40.5-gravity oil and 120 ft. of oil and gas-cut mud. Later, a 60-minute drill-stem test from 9,782-9,805 ft. resulted in 150 ft. of heavily oil and gas-cut drilling mud. It was drilling ahead at 9,807 ft. in lime.

Magnolia Petroleum Corp. 1-A Ralph, 1 mile west of the Fullerton pool in Andrews County, is dry at 10,991 ft. in Ellenburger. The well also failed to produce on tests in the Devonian and in the Clear Fork.

Chalmette Petroleum Corp. 1 Lake Shore Corp., wildcat 1½ mile north of the Fullerton field, after treating with 2,000 gal. of acid from 7,044-7,210 ft., swabbed 2 bbl. of free oil per hour and is retreating with 3,000 gal. Total depth is 7,636 ft.

Magnolia 1 Martin, wildcat between the Fullerton and Embar pools, swabbed dry and is preparing to drill out cement after plugging back to 8,780 ft. and setting 5½-in. casing at 8,965 ft.

Humble Oil & Refining Co. 88-X Means, Ordivician wildcat in the Means pool of northeastern Andrews, is drilling below 9,960 ft. in lime.

Ector County.—Shell 1-A Thomas, 1 mile northeast of the TXL discovery well, promises to be the first Ellenburger producer in the TXL pool. The well missed the Devonian, regular pay for the pool, and had only slight shows in the Silurian. Ellenburger was topped at 9,695 ft. On a 60-minute drill-stem test from 9,731-52 ft. it showed gas to the surface in 20 minutes, 130 ft. of 43.5-gravity oil and 240 ft. of heavily oil and gas-cut drilling mud. It was drilling ahead at 9,755 ft. in dolomite.

Amerada Petroleum Corp. 1 TXL, offset to the discovery well, gaged 1,435.20 bbl. of 40-gravity oil through ½-in. choke in 24 hours. Gas-oil ratio was 1,375 to 1, tubing pressure was 1,000 lb. and casing pressure 400 lb.

Mid-Continent Petroleum Corp. 1-A TXL, ½ mile southeast of the discovery well, is drilling below 8,000 ft. in lime and shale after encountering saturation in the Devonian.

Winkler County.—Phillips Petroleum Corp. 1 Talvez, on the southeast side of the Keystone-Ellenburger pool, is the first well in the area to flow from the Devonian. On a drill-stem test from 7,271-7,423 ft., gas came to the surface in 8 minutes. It began flowing mud in 28 minutes. In 39 minutes it was making oil, estimated at 10 bbl. in 35 minutes. Gas volume at the end of the test was estimated at 3,200,000 cu. ft. in 24 hours. The well also flowed from the Holt zone at 4,700-64 ft. It was drilling ahead at 7,435 ft.

One-half mile north, Gulf Oil Corp. 57-E Keystone also showed for production in the Devonian, but did not flow. On a drill-stem test in the Holt zone, it flowed 38.4-gravity oil in 45 minutes. It was drilling below 7,439 ft. in lime and shale.

WEST TEXAS SUCCESSFUL WILDCATS

Ector County: Extension to old oil pool—Rowan Drlg. Co. 1 TXL, Sec. 29, Blk. 45, T-1-S, T&P Sur., 2¾ mi. SE TXL pool, elev. 3,258 ft., Clear Fork 5,420 ft., flowed 2,780 bbl. day through ½-in. choke on tubing, perf. 7,826-7,915 ft. Devonian, top pay 7,826, plugged back to 7,916 ft., gravity 42°, gas-oil ratio 1,195, TD 7,970 ft.

Runnels County: New oil pool—O. D. Leonard 1 Livingston, Sec. 110, J. Parramore Sur., 13 mi. NE Ballinger, elev. 1,865 ft., flowed 206 bbl. day through ½-in. choke on tubing, perf. 3,015-30 ft. Cross Cut lime, top pay 3,015 ft., plugged back to 3,030 ft., gravity 39.7°, gas-oil ratio 530, TD 3,085 ft.

Winkler County: New oil pay—Sun 1 R. A. Wheeler, Sec. 13, Blk. B-27, PSL Sur., Wheeler-Ellenburger pool, elev. 3,075 ft., flowed 371 bbl. day through ¼-in. choke, perf. 8,450-90 ft., Devonian, top pay 8,348 ft., gravity 34.4°, gas-oil ratio 1,070 (regular pay flowed 590 bbl. day, perf. 10,560-600 ft. Ellenburger), TD 10,610 ft.

WEST TEXAS WILDCAT FAILURES

Andrews County: Humble 1 Jones, Sec. 17, Blk. A-40, PSL Sur., elev. 3,307 ft., Glorietta 5,570 ft., Devonian 8,282 ft., dry, TD 8,384 ft.

Borden County: Thomas W. Doswell 1 R. H. Cantrill, Sec. 22, Blk. 32, T-6-N, ELRR Sur., 12 mi. NW Gail, elev. 2,956 ft., dry in Clear Fork, TD 5,024 ft.

Coke County: Harley Sadler et al 1-B Mims, Sec. 39, Blk. W, T&P Sur., 5 mi. NE Water Valley, dry, TD 1,794 ft.

Howard County: Richfield Oil 1 F. O. Shortes, Sec. 1, Blk. 34, T-2-N, TP Sur., 10 mi. NW Big Spring, elev. 2,660 ft., San Andres 3,160 ft., dry, TD 6,010 ft.

Crockett County: Guffey Drlg. Co. 1 Geo. L. Thompson, Sec. 73, Blk. 1, I&GN Sur., 3 mi. E Iraan, elev. 2,226 ft., Yates 795 ft., dry, TD 1,253 ft.

Gaines County: DeKalb Agri. Ass'n. 1 Emory H. Breckon, Sec. 13, Blk. AX, PSL Sur., 15 mi. SW Seminole, elev. 3,440 ft., dry in Yates, TD 3,364 ft.

Sinclair-Prairie 1 Johnson, Sec. 16, Blk.

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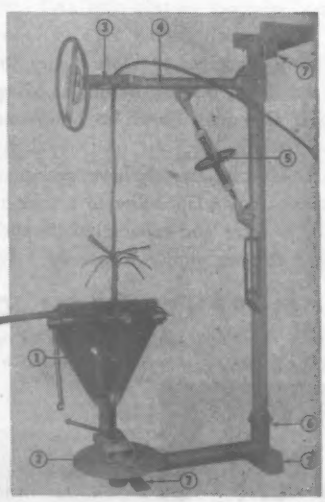

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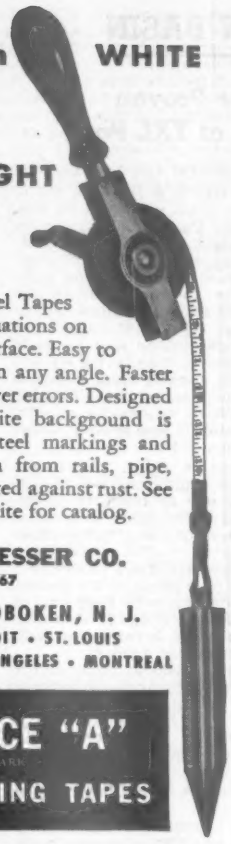

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A-28, PSL Sur., 1½ mi. N Andrews Co. line; elev. 3,536 ft., Tubb 6,640 ft., Devonian 8,050 ft., Silurian 8,535 ft., dry, TD 8,692 ft.

Hockley County: Gulf 23 Mallet, Sec. 2, Blk. X, PSL Sur., 1½ mi. SE Slaughter pool, elev. 3,583 ft., dry, TD 7,536 ft.

McCulloch County: C. W. Boyles 1 Anderson, Sec. 12, Henton Sur., 7 mi. N Melvin, dry, TD 830 ft.

(Continued on page 149)

OKLAHOMA

W. Edmond May Be Drilled Up By Labor Day

THE big four-county West Edmond field in Oklahoma, Logan, Kingfisher and Canadian counties, Oklahoma, will probably be drilled up by Labor day of this year, unless unexpected extensions are made to the area. A number of operators are reducing the extent of their drilling. Phillips Petroleum Co. and Stanolind Oil & Gas Co. are the only large operators continuing their work without any let up. Peppers Refining Co. completed six wells in the field in the past week. Some of these had been standing for some time awaiting better weather and roads. Production of the field in past week was estimated at 72,500 bbl. per day from 492 wells.

Superior Oil Co. of California 1 Norris, NE NE NE 17-19n-10w, in Blaine County, the deepest drilling well in the state, was drilling below 10,405 ft. Same company and Wikoff 1 Manning, NE NE NW 27-22n-10w, Major County, was drilling below 4,969 ft.

Sinclair Prairie 1 Webber, NW NW NW 28-20n-4w, in Garfield County, made a drill-stem test of lower Layton sand at 4,716-24 ft. and recovered 60 ft. of distillate and 30 ft. of oil-cut mud in 1 hour and 47 minutes. A second drill-stem test at 4,725-31 ft. recovered 30 ft. of oil-cut mud and 170 ft. of salt water in 2 hours. Drilling was continued.

The Crescent-Lovell area in Logan County is the most active Layton sand play in the state. Davon Oil Co. completed four producers in 14, 15 and 23-17n-4w, during the week in this 5,000-ft. development, the wells ranging from 200 bbl. per day to 40 bbl. per hour through fractional chokes. Deep Rock Oil Co. drilled a dry hole in 1 Roberts, SW NW NW 24-17n-4w, total depth 4,942 ft. Continental Oil Co. 3 Myers in Section 26 is a relatively small well at 4,940-50 ft.

Magnolia Petroleum Co. 1 Cunningham, C SE SE 33-5n-6w, an estimated 95,000,000-cu. ft. gasser in southern Grady County, which produced distillate at the rate of 30 bbl. per hour, was opened up for a test on Wednesday, but a high wind, blowing the gas toward nearby houses, caused another shutin with the hole loaded with water. Production is coming through perforations at 10,879-882 ft, total depth 10,891 ft.

WILDCAT COMPLETIONS AND DISCOVERIES

	Week ended Apr. 28, 1945					Cumulative total, 1945				
	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ohio	0	0	1	2	3	0	0	6	22	28
Indiana	0	0	0	1	1	2	0	0	7	9
Illinois	0	0	0	10	10	16	0	0	79	95
Kentucky	0	0	0	1	1	2	0	1	14	17
Michigan	0	0	0	3	3	2	0	0	74	76
Kansas	0	0	0	1	1	12	0	6	100	118
Neb., Mo., Iowa	0	0	0	0	0	0	0	0	9	9
Oklahoma	0	0	0	5	5	30	0	4	88	122
Texas:										
North Central	2	0	0	18	20	34	0	3	157	194
West	3	0	0	13	16	21	0	0	97	118
Panhandle	0	0	0	0	0	0	0	1	3	4
Eastern	0	0	0	3	3	5	2	0	30	37
Gulf Coast	0	0	0	4	4	22	1	11	82	117
Southwest	1	0	0	1	2	9	1	3	53	66
Total Texas	6	0	0	39	45	91	5	18	422	536
Louisiana:										
Northern	0	0	0	2	2	1	1	2	22	26
Southern	0	0	0	1	1	11	0	0	15	26
Total Louisiana	0	0	0	3	3	12	1	2	37	52
Arkansas	0	0	0	0	0	0	0	0	15	15
Mississippi	0	0	0	2	2	3	0	0	40	43
Ala., Ga., Florida	0	0	1	0	1	0	0	1	8	9
Montana	1	0	0	1	2	5	0	0	6	11
Wyoming	1	0	0	2	3	7	0	0	12	19
Colorado-Utah	0	0	0	0	0	0	0	0	3	3
New Mexico	0	0	0	3	3	5	0	2	21	28
California	1	0	0	6	7	1	0	2	66	69
Total United States	9	0	2	79	90	188	6	42	1,023	1,259
Total previous week	4	1	1	61	67					

OKLAHOMA WILDCAT FAILURES

Alfalfa County: Gutowsky 1 Young, NW NW 14-24n-11w, dry, TD 5,983 ft., Oswego 5,786 ft.

Garvin County: Vickers Petroleum 1 Thomason, SW SW SE 18-1n-1e, dry, TD 2,504 ft., base Pontotoc 1,900 ft.

Lincoln County: J. J. Fleet 1 School Land, SE SE SW 16-16n-6e, dry, TD 4,038 ft., Wilcox 4,002 ft.

Pawnee County: E. J. Lindsay 1 Orten, NW NW SE 33-22n-5e, dry, TD 3,217 ft., Bartlesville 3,108 ft.

Seminole County: C. W. Davy 1 Yahola, NE SW SW 9-7n-6e, dry, TD 4,744 ft., Wilcox 4,726 ft.

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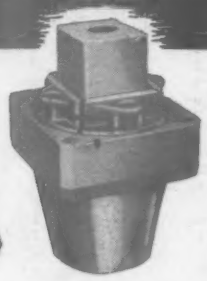

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Drilling Contractors

Lupher Drilling Co. has the contract to drill the Sohio Petroleum Co. A-2 Beulah M. Durkee, in C N½ SW NW 32-16n-6w, and the 1 F. R. Sisco, in N½ NE SW 28-16n-6w, also for Sohio, in Isabella County, Michigan.

Delta Drilling Co. was rigging up on its contract to drill the Sinclair-Wyoming Oil Co. 1 W. D. Griffith, in C NE NE 36-1n-17e, Clarke County, Mississippi.

Schoenfeld-Hunter - Kitch Drilling Co., Tulsa, has opened a district office in Odessa, Tex., to operate in the Permian basin. Walter Dick Hodges is in charge of the firm's operations in that area.

Camay Drilling Co. will drill Signal Oil & Gas Co.'s new wildcat on the Needham property on the Soledad anticline in the Newhall-Castaic region in California. It is expected that spud will be made in the next 10 days, though considerable road building will be necessary before material can be moved in.

Olson Drilling Co. has the contract to drill the 1 Springer, in C SW SW 35-32-4w, Sumner County, Kansas, owned jointly by Carter Oil Co., Pure Oil Co., and Sun Oil Co. This test is approximately 16 miles west of the Wellington pool production.

John H. Wilson is the drilling contractor on the Howard L. Foster 1 C. B. Johnston et al, in NE NW SW 26-8n-8w, Ionia County, Michigan.

R. D. Morgan is the contractor on the J. L. Cates 1 J. A. Steele, Tr., in SW NW SW 6-21n-2e, Greene County, Alabama.

Bell & Loffland are making good progress on its contract with Standard Oil Co. of California in drilling its wildcat on the Pico anticline in the Newhall-Castaic region of California. This is the deepest test drilled to date on the Pico anticline. The 8,200-ft. level has been passed.

W. H. Black and **Arthur Kincaid,** both of Wichita, Kans., have purchased three strings of drilling tools and will engage in contract drilling in West Texas and New Mexico.

Parker Drilling Co., contractor on the Humble Oil & Refining Co. 1 Denkmann Lumber Co., in C NW SE 27-9n-19w, Jeff Davis County, Mississippi, was moving in material.

A. W. Hutchins, drilling contractor who has been operating in the Heidelberg and Eucutta fields of Mississippi, is reported to have completed a deal with Davidor & Davidor whereby he takes over a block in Marengo County, Alabama. Equipment was being moved to the location.

Helmerich & Payne has the contract and was moving in tools to start the Texas Co. 1 Wirt, in NW NW SW 11-35-2w, Sumner County, Kansas. This is a subsurface prospect, and is located at the southern edge of the county, 6 miles east of the town of Caldwell. Same contractor also has the contract on the Carter Oil Co. 1 Chappie, C 21-31-32w, Seward County, Kansas. This test, based on subsurface information, is near the Hugoton area.

C. K. Dean is contractor on the M. B. Belden 1 H. B. Fawcett and H. S. Belden, Jr., in NE NE NE 33-16n-14w, Newaygo County, Michigan.

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Nelson Drilling Co., contractor on the Westgate-Greenland Oil Co. 1 Prescott, NW SE SW 17-14-2w, Saline County, Kansas, was drilling below 2,735 ft. The test is on a 5,000-acre block owned by Westgate Greenland, and is based on subsurface information.

Captain Denny Morrison, Tulsa, a partner in the **Morris Brothers Drilling Co.,** has been returned to inactive duty after 2½ years in the Army.

C. J. Haas, formerly of Sohio Petroleum Co. at Shreveport, La., has joined **Roy Guffey Drilling Co.,** of Dallas. For the past 3 years he has been general superintendent of production for Sohio's Shreveport division, and before that was general superintendent for Adams Oil & Gas Co. in Illinois for 5 years.

R. L. Johnson has the drilling contract on the Capital Oil & Gas Co. 1 Ethel Gholson, in SE SE 18-14n-22e, Bullock County, Alabama.

Martin Harris Drilling Co. has been awarded drilling contract on the J. H. Gwin 1 Allison Lumber Co., in C NE SW 36-19n-4w, Sumter County, Alabama.

Union Drilling Co. is contractor on the Taggert Brothers Co. 1 Wilson, in C SE 35-17n-8w, Osceola County, Michigan.

Trigg Drilling Co., Oklahoma City, announces that Walter H. Smith, formerly of Oakland, Calif., has joined the company.

Ferguson & Shafer is contractor on the Carl E. Grimes 1 Minnie Dykstra, in NW NW SE 34-5n-15w, Ottawa County, Michigan.

Loffland Brothers, Tulsa, will drill the Phillips Petroleum Co. 1 Nienstedt, a scheduled 12,500-ft. test in SW 20-4s-6e, St. Landry Parish, Louisiana.

Rocky Mountain Area

(Continued from page 142)

at 4,010 ft., probably in the G-P sand above Frontier.

MONTANA SUCCESSFUL WILDCAT

Toole County, Kevin-Sunburst: Consolidated Gas 1 Gillespie, SE NW SE 15-35n-4w, TD 2,341 ft., oil show in Ellis at 2,316 ft., another in Ellis-Madison contact at 2,333 ft., acid. 1,000 gal., bailed ½ bbl. per hour, on pump made 15 bbl. per hour through 2-in. tubing, no water, minor high west of Rimrock pool.

MONTANA WILDCAT FAILURE

Toole County, Devon area: Texas 2 Ekholt, NW SE NW 3-33n-1e, TD 1,670 ft., Ellis-Madison at 1,660 ft., dry, sulfur water at 1,668-70 ft.

CALENDAR

May

American Institute of Chemists, Medal meeting, Columbus, Ohio, May 11.

June

Interstate Oil Compact Commission, quarterly meeting, Oklahoma City, June 15-16.

Canadian Gas Association, annual convention, Manoir Richelieu Hotel, Murray Bay, Quebec, June 19-22.

October

Texas Mid-Continent Oil and Gas Association, Rice Hotel, Houston, October 4-6.

I.P.A.A., annual membership meeting, convention city to be selected later, October 15, 16 and 17.

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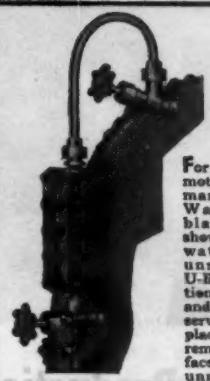
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PERSONALS

If It's Production He Knows the Answers

IT is said of Max App, now head of the production department of General Petroleum Corp., that if it's production he knows the answer; for his interest has centered on that branch of the oil business more than 30 years, and he has accumulated a wealth of experience. App joined General Petroleum in 1912 as an engineer in the San Joaquin Valley. With the prospect of greatly increased drilling incident to discovery and development of fields in Los Angeles Basin, the company moved him to the southern division in 1922.

Five years later App was promoted to production superintendent and transferred to the San Joaquin division. He was assigned to the headquarters of General Petroleum in Los Angeles in 1938 as acting general superintendent of production. He was appointed general superintendent the next year, and was made assistant to Ben E. Parsons, manager of the production department in 1943. He filled the latter position until his recent advancement to manager of the department.

H. C. O. Clarke, Pure Oil Co., has been placed in charge of company offices recently opend in Billings, Mont. The company is expected to become active in wildcatting in the Rocky Mountain area.

George O. Ingram, assistant controller of the Standard Oil Co. of New Jersey, and **Phillips C. Salman,** assistant controller of Socony-Vacuum Oil Co., Inc., both of New York City, have been elected to membership in the Controllers Institute of America.

Harold H. Healy, division manager of the Ohio Oil Co. for the Rocky Mountain area, with headquarters at Casper, has been elected vice president of the Rocky Mountain Oil and Gas Association.

L. A. Mekler, combustion engineer and member of the engineering and development department for Universal Oil Products Co., has assumed a new position as engineering consultant to the Institute of Gas Technology and the Armour Research Foundation of Illinois Institute of Technology.

C. D. MILLER

C. D. (Yank) Miller, vice president in charge of production, has been appointed executive vice president of the British - American Oil Producing Co. at Tulsa, it was announced by **W. K. Whiteford,** president of the company. Miller also becomes first vice president of the Toronto Pipe Line Co., transportation subsidiary of the British-American.

H. A. Eklund of Los Angeles has been elected vice president and manager of the land department of British-American Oil Producing Co. and **J. E. Matter** has been appointed manager of the exploration department. **O. I. Torkelson** has been appointed manager of the exploitation department.

I. I. Shultz, who has been a technologist at the Torrance plant of Shell Oil Co.'s Chemical Division, has been advanced to assistant chief technologist at the same plant.

John H. Fields, petroleum engineer for Sohio Petroleum Co., has been transferred to Oklahoma City from Ardmore, Okla.

A. L. Dade, in charge of pipe lines for Deep Rock Oil Corp., and **G. S. Dille,** in charge of land and exploration, were elected vice presidents at the recent annual meeting of the company. Each will continue to perform his former duties. Other officers and directors, including **Henry N. Greis,** president, were reelected.

H. C. Arnold, who has been vice president of the British - American Oil Producing Co. since 1938, has resigned to become vice president in charge of oil and gas exploration for Ashland Oil & Refining Co., with headquarters in Tulsa. Arnold was with Barnsdall Oil Co. in Tulsa prior to going with British-American.

C. L. Hedman, assistant chief engineer at Shell Oil Co., Inc.'s Shell Point, California, plant has been transferred to the Cactus plant as assistant engineer to succeed **G. P. Forbes,** who has been appointed senor engineer and transferred to the Los Angeles office.

E. W. Pauley, president of Petrol Corp., Los Angeles, has been named the American member of the Allied Reparations Commission, with the rank of ambassador, The appointment was made by President Truman, and the commission is expected to meet in Moscow, under the terms of the Yalta agreement, shortly after May 10.

George Turner has been transferred from Ponca City to Oklahoma City to assume his new position of production superintendent for the central Oklahoma division of Phillips Petroleum Co. He succeeds **James P. Stephens,** who has been appointed drilling superintendent of the southwestern division, succeeding **Doris Ballew,** resigned.

Russell H. Venn assumed new duties for the Humble Oil & Refining Co. recently. He is now technical assistant to Director **Harry W. Ferguson,** who was recently elected to the board of directors. Venn has been a Humble man since 1934, and most recently was in the New Projects Group, where his duties included general coordination on the Baytown Ordnance Works program, the butadiene, and butyl rubber plants, as well as the Ingleside butadiene plant.

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Permian Basin

(Continued from page 145)

Pecos County: General Crude and Tide Water H. L. Winfield, T&St.L. Sur., 7 mi. SE Ft. Stockton, dry in San Andres, TD 3,165 ft.

Milton Unger 1 J. L. McMurtry, Sec. 66, Blk. 10, H&GN Sur., 2 mi. S Lehn pool, elev. 2,450 ft., dry, TD 1,747 ft.

Runnels County: Eltex Oil 1 D. S. Wilkinson, Sec. 17, T&P Sur., 2 mi. NE Crews, elev. 2,024 ft., dry, TD 3,634 ft..

Winkler County: Humble 1-B W. F. Scarborough, Sec. 11, Blk. B-27, PSL Sur., 9 mi. W Kermit, elev. 2,920 ft., dry, TD 3,500 ft.

SOUTHEASTERN NEW MEXICO

HOBBS.—McElvain Bros. 1 T. F. Sealey, 30-18s-34e, 4 miles southeast of the Corbin pool in Lea County, after swabbing from 4,675-86 ft., showed an estimated 10 to 12 bbl. of oil in 24 hours. With a total depth of 4,850 ft. in tight lime, it drilled through 330 ft. of oil-stained brown lime with very little porosity.

Phillips Petroleum Corp. 4 Lea-Mex, wildcat northeast of the Maljamar pool in Lea County, is drilling below 11,541 ft. in Ellenburger dolomite unchanged.

Humble Oil & Refining Co. 1 Neville G. Penrose is a new 6,500-ft. test to the Lower Permian in the Penrose district. It is 660 ft. from the north line and 1,980 ft. from the east line of 13-22s-37e. It is a southeast offset to Penrose 3 Hinton which is now drilling below 4,000 ft.

SOUTHEASTERN NEW MEXICO WILDCAT FAILURES

Eddy County: M. D. Bryant et al 1 Edgar Williamson, 10-21s-31e, 4½ mi. S Halfway pool, Delaware 4,170 ft., dry, TD 4,185 ft.

Lea County: Culbertson & Irwin 1 Culbertson, 26-22s-32e, SW part of county, elev. 3,757 ft., dry, TD 4,977 ft.

Roosevelt County: Frank Hill et al 1 Caudell, 22-2s-30e, 3 mi. E Claudell, dry, TD 700 ft.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, General Land Office, Washington, D. C. Notice is hereby given that the SW¼SE¼ sec. 21 and NW¼NE¼ sec. 28, T. 19 S., R. 37 E., N.M.P.M., New Mexico, 80 acres, within the known geologic structure of the Monument oil field, is offered as a single parcel to the responsible qualified bidder of the highest cash bonus per acre for lease under section 17 of the mineral leasing act, as amended by the act of August 21, 1935 (49 Stat. 674, 30 U.S.C. sec. 226). Sealed bids will be received in the office of the Commissioner of the General Land Office, Interior Building, Washington 25, D. C., up to twelve noon, May 7, 1945. Each bidder must submit a certified check or cash for one-fifth of the amount bid payable to the order of the Treasurer of the United States and file the showing of qualifications to receive a lease required by section 7 of Circular 1386. The remainder of the bonus bid and the annual rental at the rate of $1 per acre must be paid, and a $5,000 corporate surety bond must be furnished by the successful bidder prior to the issuance of the lease. The deposits of the other bidders will be returned upon acceptance of the successful bid by the Secretary of the Interior. The envelopes should be plainly marked "Bid for lease, Monument oil field, New Mexico. Not to be opened before noon, May 7, 1945." No bids received after the hour fixed herein for submitting bids will be considered. The successful bidder will be required to agree not to discriminate against any employee or applicant for employment because of race, creed, color, or national origin and to require an identical provision to be included in all subcontracts. Bidders are warned against violation of section 59, U. S. Criminal Code, approved March 4, 1909, prohibiting unlawful combination or intimidation of bidders. The right is reserved to reject any and all bids in the discretion of the Secretary of the Interior. Fred W. Johnson, Commissioner.

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Men in Equipment News

John L. Young has been elected to the newly created post of vice president in charge of engineering of United States Steel's National Tube Co. Previously he was vice president in charge of industrial research and development of United Engineering & Foundry Co. in Pittsburgh, Pa.

R. A. Feemster and **M. L. Walraven, Jr.,** have been appointed to sales management positions with Kobe, Inc., a member of Dresser Industries. Feemster will headquarter in Dallas and will coordinate the activities of the Gulf Coast, East Texas, West Texas and North Texas. Walraven, who will continue to headquarter in Tulsa, will direct activities in Oklahoma, Kansas, Wyoming, Nebraska, and Illinois. Kobe, Inc., also announces the establishment of a general technical service department under direction of **W. F. Slater,** who will be in charge of all the company's technical field activities. Previous to this appointment, Slater was California division manager.

M. E. Burkhart has been appointed vice president in charge of sales for Key Co., East St. Louis, Ill., replacing **B. J. Gross,** who will transfer to the company's eastern office, 420 Lexington Avenue, New York City. Burkhart has been with the company for 18 years, and chief engineer since 1939. **G. C. Smith** will be associated with Gross in New York.

Alfred Kauffman, retired president of Link Belt Co., has been elected a director of Gardner-Denver Co., succeeding P. H. Gardner, who resigned because of ill health. Kauffman is also board member of La Plant Choate Manufacturing Co. and Cardox Co.

George H. Woodard has been appointed manager of the aviation gas-turbine division of Westinghouse Electric & Manufacturing Co., a new division formed for the manufacture of military and, later, commercial gas-turbine aircraft engines. **W. F. Boyle** has been named sales manager of the new division, **Reinout P. Kroon** manager of the engineering department, and **Samuel S. Stine** manager of manufacturing.

Dr. Donald Price has been appointed technical director of Oakite Products, Inc. He will direct the activities of the company's engineering and chemical staffs, including its research laboratory and technical service department.

P. M. Hutchins has been appointed manager of advertising and sales promotion for The National Radiator Co., and has already assumed his new position, with headquarters in Johnstown, Pa.

J. O'H. Anderson and **H. B. Spackman** have been appointed assistant general managers of sales of Jones & Laughlin Steel Corp., effective May 1. Other sales office appointments are: **V. A. Jevon,** assistant general manager of sales, to be in charge of Pittsburgh district sales office activities; **C. T. Hapgood,** to be manager of sales of tubular products; **E. W. Harwell,** to be district sales manager, Philadelphia office; **L. C. Berkey,** to be district sales manager, Chicago office; **C. C. Wehling,** to be district sales manager, St. Louis office. The company's district office in Chicago has been moved to the Field Building, 135 South LaSalle Street.

Rubin Lewon, under direction of recently appointed **Dr. A. M. Erskine,** director of research for both The Paraffine Companies, Inc., and Plant Rubber & Asbestos Works, has been appointed manager of research for the latter company. **Louis L. Collonge** has been appointed superintendent of the Precision Molded 85% Magnesia plant at Emeryville, Calif. **E. Fred Karklin** is new superintendent of the Redwood City plant and salt works operation. **Walter Rohde** has been appointed manager of production control, with headquarters in San Francisco, while **Victor Sagues** will continue as superintendent of the San Francisco factory.

B. F. Lease has been elected president of Athey Truss Wheel Co., to succeed the late C. K. Davis. Lease was previously vice president in charge of sales, advertising, and service.

A. KAUFFMAN

G. H. WOODARD

DR. D. PRICE

Howard W. Kelsey has been named sales promotion manager of the general products division of United States Rubber Co. For the past 10 months he has been handling wire and cable promotion in the company's mechanical goods division.

M. E. Montrose, formerly director, vice president, and manager of services and sales of Lane-Wells Co., has been elected president, general manager, and director of Marion Steam Shovel Co., Marion, Ohio. Montrose resigned his connection with Lane-Wells in February.

James A. Roach, formerly with Mercury Manufacturing Co., Chicago, Ill., is a newly appointed factory representative for Hyster Co. He will cover the Atlantic seaboard states for the company with headquarters at the New York City office.

Fred Dowling, southern manager for Hyster Co., has designed several new materials-handling programs as a result of recent surveys in his territory.

Ward Keener has been appointed assistant to the president of The B. F. Goodrich Co. Keener has been with the company since 1937, and since 1942 has been director of business research and assistant to the vice president for finance.

C. E. Mason has been appointed technical director of The Bristol Co., Waterbury, Conn. He will make his headquarters at the company's general offices.

Jim Ritchie has established the Jim Ritchie Co., an industrial and pipe-line engineering service and distributor of lubricating-oil-conditioning equipment. The company will serve as sales agency for Double Seal Ring Co., of Fort Worth, Tex.

P. R. Mork has been elected executive vice president of Crane Co., Chicago, Ill., and **J. A. Dwyer,** vice president in charge of sales.

Col. G. deFreest Larner has been appointed assistant to the president of H. K. Porter Co. He will have charge of termination of war contracts, renegotiation, and special tax problems.

INDUSTRIAL ITEMS

Malcolm W. Back & Co., 41 East 42nd Street, New York City, has been appointed exclusive representative in metropolitan New York and surrounding territory by Daniel Orifice Fitting Co., of Los Angeles, Tulsa, and Houston.

Stockholders of Westinghouse Electric & Manufacturing Co. at their recent annual meeting voted to split the company's stock on the basis of four shares for one and also to change the company's name to Westinghouse Electric Corp., for brevity. The stockholders also elected seven present directors to the board. Four were elected for 4-year terms. They are: **George H. Bucher,** president of Westinghouse; **W. C. Robinson,** president, National Electric Products Corp.; **Arthur W. Page,** vice president, American Telephone & Telegraph Co., and **Robert T. Swaine,** senior member of the law firm of Cravath, Swaine & Moore. **H. B. Higgins,** president, Pittsburgh Plate Glass Co., was elected for 3 years. Named for 1-year terms were **Gwilym A. Price,** Westinghouse vice president, and **John R. Read,** chairman of the board and president of Canadian Westinghouse Co.